

Sustainability, Climate Change and the Green Economy

Godwell Nhamo and Vuyo Mjimba (eds)



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**Africa Institute
of South Africa**
Development Through Knowledge

SUSTAINABILITY, CLIMATE CHANGE AND THE GREEN ECONOMY

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Foreword

This book addresses topical matters in the sustainability, climate change and the green economy (including green growth) space. The subject matter is critical, given that 2016 marks a global shift to the new sustainable development agenda that is transmitted through 17 sustainable development goals (SDGs) that are to be implemented in the 15 years to 2030. Other global landmarks of interest include the SENDAI Framework on disaster risk reduction, also with a lifespan of 15 years, ending in 2030. On the climate governance front, the new Paris Agreement is expected to usher in a new global agenda on climate change. At the African continent level, there is Agenda 2063.

Innovation is a big concept. Traditionally, innovation has been associated with research and development (R&D) originating from the Northern Hemisphere, where many developed nations are based. Linked to innovation are matters pertaining to technology development, its testing, diffusion and deployment. However, technological and service innovation from the developed world always come at a huge cost, as it is protected by Intellectual Property Rights (IPR) and associated patent laws. Hence, much of the advances made in the developed nations have resulted in the perpetual impoverishment of poor nations that use and lose foreign currency in procuring such technology and services. Over the years, however, the world has witnessed some shift, as emerging economies (led by countries like Brazil, China, India and South Africa) have started to feature on the global innovation radar. We have also witnessed more global calls for the use of generic products, as patent laws are relaxed. This has seen the manufacture of cheaper goods and the procurement of cheaper services, especially in the pharmaceuticals industry. In the sustainable development arena, this will fast-track the transition to the green economy. Given that movement and progress in the sustainability space demands that innovation comes from every corner of the world, more innovation is therefore expected from developed countries, particularly in terms of climate change adaptation technologies.

Although there are 17 SDGs, a number are directly applicable to the theme of this book, namely:

- SDG 2 – end hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- SDG 6 – ensure availability and sustainable management of water and sanitation for all;
- SDG 7 – ensure access to affordable, reliable, sustainable and modern energy for all;
- SDG 13 – take urgent action to combat climate change and its impacts;
- SDG 14 – conserve and sustainably use the oceans, seas and marine resources for sustainable development; and

- SDG 15 – protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

From the perspective of the African continent, Agenda 2063 has put a development blueprint on the table, which embraces sustainable development as the dominant paradigm. Agenda 2063 includes in its seven aspirations, the need to embrace gender and protect the disadvantaged in society. The Agenda further makes it explicit that the continent should prioritise climate change adaptation over mitigation. Needless to say, the continent is aware of the opportunities provided by engaging in climate mitigation initiatives, including renewable energy, energy efficiency and conservation.

At Paris 2015, the world witnessed a new global climate governance order that will demand swift new and ongoing innovations. The Paris Agreement collapses the dichotomy between the developed North (formerly Annex 1 countries) and the developing South (formerly Non-Annex 1 countries). All countries are now expected to do something to promote climate compatible development. This is to be done in accordance with a country's differentiated capabilities and responsibilities. Hence, the world expects countries like the United States (US) and China to do more, as they have the capacity to do more than other countries can. What remains is the political will. Global citizens are watching the space as countries deposit their ratification instruments to follow up on their Intended Nationally Determined Contributions (INDCs) to NDCs. On 29 March 2016, Papua New Guinea became the inaugural country to ratify its INDC. Although the country might be small in size, its commitment to have 100 per cent renewable energy supplies by 2030 is significant in keeping the world below the two degrees Celsius temperature increase band. This band is one that scientists consider will place the world on a more sustainable development path. There is therefore hope that all other countries, particularly heavy polluters like China and the US, will do likewise sooner rather than later. At the time of finalising this book, world leaders were convening in New York in April 2016 to celebrate the Paris Accord.

Lastly, this book touches on the ongoing debates on the green economy and green growth. Being a part of the discourses to move the world into the future on a low carbon development pathway, the green economy is viewed by many as one of the plausible platforms to attain sustainable development resulting in sustainable jobs creation, poverty eradication as well as inclusive and equitable growth. The environment and ecosystems that support human life and well-being should be protected and human beings need to divert from overconsumption and polluting production platforms. The green economy implies that all global citizens must promote a sustained structural change from resource intensive lifestyles to resource efficient lifestyles. The green economy is therefore both a means and an end to achieving sustainable development.

It is my hope that readers of this inspiring book compilation will become transformed and work towards their individual and collective contributions to make the world a better planet. Let us be good ambassadors for sustainable livelihood through the promotion of innovation for sustainability under climate change and a green economy.

Ms Cecilia Njenga

Head: UNEP Office in South Africa

United Nations Environment Programme (UNEP)

Preface

The book *Sustainability, Climate Change and the Green Economy* comes in six parts, made up of 14 chapters in total. Part 1 comprises a single chapter that covers the context of innovation for sustainability under climate change and a green economy. Part 2 looks at the green economy and green jobs. Part 3 reflects on sustainable development. Natural resources and wetlands management are the focus of Part 4 of the book. Part 5 of the book focuses on climate change, tourism and wildlife matters. The last part of the book (Part 6) is another single chapter, which articulates issues emerging from the whole book and presents some policy and take-home messages.

Professor Godwell Nhamo (PhD)

Editor and Project Leader

Exxaro Chair in Business and Climate Change, Unisa

Dr Vuyo Mjimba (PhD)

Co-Editor

Human Sciences Research Council (HSRC)

Acknowledgements

The Book Project Leader and Editor, Professor Godwell Nhamo wishes to thank the following organisations and people for their generous support financially and in kind. Exxaro Resources Ltd is hereby acknowledged for its financial support since 2008. The authors, blind peer reviewers, the CEMS Deanery at Unisa, the Institute for Corporate Citizenship had an invaluable input in the writing and publishing process for all the support they continue to render towards my work. I also express my sincere thanks to the publishers hereby acknowledged for a quality product. This gesture will not be complete without acknowledging one of Unisa's executive management team members that drives the Green Economy and Sustainability Model with the championing it deserves: Principal and Vice-Chancellor of Unisa, Prof Mandla Makhanya.

The following organisations are also acknowledged for various parts they played during the successful hosting of the 2015 inaugural International Conference on Innovation for Sustainability under Climate Change and Green Growth/Economy to which papers selected from that conference form part of this book: University of South Africa (Unisa), Department of Environmental Affairs (DEA), University of Pretoria, University of the Witwatersrand (Wits), South African Local Government Association, National Business Initiative (NBI), Blankcanvas Intl, MW Club Motors (Pretoria), Matayo Biofuels, National Treasury (South Africa), Department of Science and Technology (DST), Development Bank of Southern Africa (DBSA), SEED Initiative, Saine Innovation Network, Gliimo (Pty) Ltd, Green Fund, Southern Africa Society for Disaster Reduction, Global Green Growth Institute, Hisense, Cennergi and the Human Sciences Research Council (HSRC).

Dedication

The editors wish to dedicate this publication to their family members. For Dr Vuyo Mjimba; his mother, Mrs Sherry Mjimba, and children Vuyisile, Nomvula and Busisiwe Mjimba. For Prof Godwell Nhamo; his spouse Dr Senia Nhamo and children Anesu, Tsitsi and Makanaka Nhamo.

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The Book Project Leader and Editor, Professor Godwell Nhamo wishes to thank the following organisations and people for their generous support financially and in kind. Exxaro Resources Ltd is hereby acknowledged for its financial support since 2008. The authors, blind peer reviewers, the CEMS Deanery at Unisa, the Institute for Corporate Citizenship had an invaluable input in the writing and publishing process for all the support they continue to render towards my work. I also express my sincere thanks to the publishers hereby acknowledged for a quality product. This gesture will not be complete without acknowledging one of Unisa's executive management team members that drives the Green Economy and Sustainability Model with the championing it deserves: Principal and Vice-Chancellor of Unisa, Prof Mandla Makhanya.

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The Peer Review Process

Chapters in this book underwent the standard blind peer review process with authors having to work and incorporate the observations and comments made by the reviewers. The whole book also went through the blind peer review process through the AISA Press mechanisms with authors incorporating the third set of comments. The editors presided over the incorporation of all peer review comments and observations so that the quality of the product was enhanced. Out of 18 chapters submitted for this book project, six (6) were rejected after the blind peer review processes and subjection to plagiarism checks. The blind peer reviewers and the editors made sure that only high quality work was finally accepted in the book. Authors take full responsibility for any liabilities associated with their work.

Contributing Authors

- **Prof Godwell Nhamo** (*Editor and Project Leader*) is a Full Professor, Chief Researcher and Chair for the Exxaro Chair in Business and Climate Change at the University of South Africa (Unisa). Professor Nhamo has published widely on green economy transition, climate change and other related environmental topics. Among his offerings are four edited books entitled: *Green Economy and Climate Mitigation: Topics of Relevance to Africa* (2011); *Breakthrough: Corporate South Africa in Green Economy* (2014); *Land Grabs in a Green African Economy* (2014); and *Climate Change Education in the SADC School Curriculum* (2015). Since 2013, Professor Nhamo has graduated seven doctoral candidates and is currently supervising three others. Professor Nhamo has also published many journal articles and book chapters and sits on a number of boards and technical panels that address issues in his research space. He has hosted 10 postdoctoral fellows from across Africa. Professor Nhamo has received many awards, the latest (2016) including: Unisa Chairperson of Council Award of Excellence in Overall Job Performance and Community Service; Unisa Vice Chancellor Award for Research Excellence. Lastly, Professor Nhamo is a known international (motivational) speaker and regularly gets invited to speak during graduation ceremonies and to deliver keynote speeches to many international conferences and gatherings in his field of expertise. Email: nhamog@Unisa.ac.za or godynhamo@yahoo.com

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- **Adriaan Buys** is a PhD student in Environmental Management at Unisa. He is also Managing Director and Researcher at iFeedback Consulting. His Doctoral research focusses on developing a strategic framework for conservation areas in Southern Africa. The research will assist public and private conservation areas to optimise their business model, thus reducing the need for public funding and increasing the land under management. His poster presentation of the concept 'Inspiring the new generation: Bushbaby junior rangers' was presented at the IUCN World Parks Congress in Sydney in November 2014. iFeedback was established in 2011, with its main focus being developing solutions to allow academic institutions to collect and manage data. During his research career at iFeedback, Adriaan took part in various academic projects, including 'The University of Stellenbosch Management Index', 'UNISA – South African National Employee Engagement Survey' and the 'National Survey of Nutrition Support Practices in Intensive Care Units'. His article 'Big Data and Data Science: Big Opportunities for Market Research Specialists' was published in the *Southern African Journal of Market Research* in 2015. Before his research career, Adriaan held management positions at DairyBelle, Unilever and Colgate Palmolive. He is supported by his wife Hilary, son Dylan and Daughter Shannon.

- **Mr Henri-Count Evans** is a climate change communication researcher. He attained a Master of Social Science (Research) Degree in the discipline of Culture, Communication and Media Studies from the University of KwaZulu-Natal in South Africa. Henri-Count is currently a PhD Candidate at the University of KwaZulu-Natal in the Centre for Communication, Media and Society. He has done research work pertaining to media practice and reporting of climate change issues and sustainable development. The research covered the print, electronic media and the new media of communication in Zimbabwe, Southern Africa and the world at large. Henri-Count has presented at several academic conferences, has published two book chapters and is currently working on upcoming peer-reviewed journal articles and conference proceedings.

- **Ms Buhle Francis** is a Researcher employed by the Institute of Development Studies at the National University of Science and Technology (NUST) in Zimbabwe. She is located in the Climate, Water and Energy Unit. Her research focus areas include green economy transition, climate change and disasters. Buhle is involved in an international collaborative initiative with the Agricultural Intercomparison and Improvement Project (AgMIP). In the AgMIP, Buhle works on stakeholder engagement and assists in disseminating appropriate climate change information. She further engages at the national level on policy issues in her areas of interest. Buhle has participated in a number of national projects, including the validation of climate policy. To date, Buhle has supervised over 20 dissertations

at Master's level. A Rotarian and the President of Rotary Club of Bulawayo South in Zimbabwe, Buhle won the first prize at the African Young Graduate Scholars (AYGS) conference that was organised in 2014 by Africa Institute of South Africa in collaboration with the University of Johannesburg (UJ). Currently, Buhle divides her time between NUST and the Department of Environmental Science at Rhodes University, South Africa, where she is doing a PhD in Environmental Science.

- **Ms Claudia Gossow** is a Master's student in Psychological Research Consultancy at the University of South Africa (Unisa). Her research focusses on exploring environmentally sustainable practices and attitudes locally. She aims to broaden knowledge regarding the link between environmental practices and human well-being. Claudia has been practicing as both a freelance and executive research consultant since 2014. Her research projects focus on small business, financial, social, economic and political developments in Africa. Her interest is to develop socio-economic psychological frameworks and concepts to assist local role players in developing suitable and effective policies or initiatives affecting environmental and human well-being. Claudia presented a paper during the inaugural international conference on Innovation for Sustainability under Climate Change and Green Growth/Economy that took place in Boksburg, South Africa, in May 2015. Her paper was titled, 'Green Jobs in the South African Context: Addressing Recent Socio-Economic Developments'. During her research career, Claudia co-authored a published report, labelled 'The Conduciveness of Starting and Conducting Business in Africa: an SME Landscape Study'. She is supported by her fiancé, Louis Swanepoel, and a supportive family in Namibia.
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biodiversity legislation; plant ecology; and other related natural resources management issues. Recent publications include: 'Mainstreaming biodiversity and wildlife management into climate change policy frameworks in selected east and southern African countries', published in *Jamba - Journal of Disaster Studies* (2016); and, 'Impact of African elephants on baobab population structure in northern Gonarezhou National Park, Zimbabwe', published in *Tropical Ecology* (2014). Olga was awarded a post-Master's Research Fellowship under the Climate Impacts Research Capacity and Leadership Enhancement Inaugural Cohort, in 2015, and she was hosted by UNISA under the Exxaro Chair in Business and Climate Change.

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- **Ms Nompe Ntombela** is a Research Assistant in the Institute for Corporate Citizenship (ICC) at the University of South Africa (Unisa). She also works under the Exxaro Chair in Business and Climate Change, hosted by the ICC. Ms Ntombela holds a Master's degree in Sociology and is currently working on a PhD in Sociology. Her research interests are in migration and socio-economic and political contestations in renewable energy technologies at local government level.
- **Mr Masimba Nyamanhindi** is a development practitioner who specialises in climate change, natural resources governance, livelihood and food security. He is working towards developing solutions that enable rural communities to enhance their management of natural resources and land, in order to meet the challenges of sustainability, while increasing food production. He researches environmental economics and the green economy as it relates to applying economic principles to the management of environmental and natural resources. Mr Nyamanhindi has a strong bias in studying how societies can attain economies that reduce environmental risks and ecological scarcity – and ensuring that rural development

meets the triple perspectives of economic viability, social acceptability and preservation of environmental quality. He holds an MSc in Development Studies from the National University of Science and Technology, which he obtained in 2014. He is working towards obtaining another MSc in International Rural Development with the Royal Agricultural University in Cirencester, United Kingdom (UK). This follows his receiving the Chevening/Africa Fellowship (awarded for academic excellence and outstanding leadership potential).

- **Mr Nedson Pophiwa** is a Chief Researcher: Governance, Democracy and Service Delivery at the HSRC in South Africa. Nedson's research interests are in the fields of human mobility, commodity flows across international borders and sustainable development. He has published several journal articles and book chapters, and has co-edited a book in these research areas. The chapter in this book, which he co-authored with Ms Nompe Ntombela, reflects his interest in the relationship between migration and global environmental change.
- **Dr Ishmael Sango** holds a Doctorate in Environmental Management from University of South Africa (Unisa). He specialises in environmental planning and management for sustainable development in both the urban and rural context. Dr Sango is currently a senior lecturer in Environmental Planning and Management at Chinhoyi University of Technology in Zimbabwe. Dr Sango has a specific research interest in exploring cost-effective solutions for addressing conflicts between livelihoods and/or local economies and environmental sustainability in both economically challenged and affluent societal settings. He is engaged in a number of research projects on the subject of community vulnerability to climate change and options for sustainable climate-smart livelihoods and/or economies. He has published a number of papers on environmental sustainability issues concerning regional and local development. Dr Sango is currently actively engaged in the consultative process for Zimbabwe's National Climate Change Adaptation Plan development process, which will feed into the National Climate Change Response Policy.
- **Mr Mkhokheli Sithole** is a natural resource management practitioner awaiting PhD graduation in Natural Resources Management at the University of the Witwatersrand in South Africa. He holds an MPhil in Development Studies specialising in Geography from the Norwegian University of Science and Technology and a BA (Honours) degree in Geography from the University of Zimbabwe. Mr Sithole works as a Research Fellow at the Institute of Development Studies, National University of Science and Technology, Bulawayo, Zimbabwe. He has published on climate change related disasters, natural resource management and other environmental topics. He has led a number of research initiatives and projects in academia

and in civil society. Mr Sithole currently sits on the board of Matobo Development Trust Council and the Dambari Wildlife Trust Research Board, where he is the environmental sustainability expert. Recent research published includes an environmentally sustainable artisanal mining manual for southern Africa.

- **Dr Ivor Sarakinsky** holds a PhD in Political Studies and currently lectures in the School of Governance at the University of the Witwatersrand. He has lectured at a number of South African universities in the areas of Political Philosophy, South African Politics and post-graduate courses in Public Governance. He has supervised numerous Masters and PhD students in a diverse range of research themes. His scholarly research is published in ranked international and national peer reviewed journals. He has also contributed chapters to numerous edited books. In addition, Dr Sarakinsky has applied Governance experience and was part of the team that drafted the assessment methodology for the African Peer Review Mechanism. He has also worked on numerous projects in government on an advisory and/or consultancy basis. Dr Sarakinsky also worked as a Chief Director in the Economic Development Department between 2010 and 2011 and was responsible for coordinating the Green Economy as per the Outcomes approach managed by the national Department of Planning, Monitoring and Evaluation.

About the Book

This book is a compilation of blind peer reviewed chapters from an inaugural International Conference on Innovation for Sustainability under Climate change and Green Growth/Economy. The conference took place at the Birchwood Hotel in Boksburg in South Africa from 26 to 28 May 2015. More than 400 participants from across the world took part in this three-day event hosted in the Ekurhuleni Metropolitan Municipality. The book is a direct product of the Exxaro Chair in Business and Climate Change hosted by the Institute for Corporate Citizenship (ICC) at Unisa. The ICC falls within the College of Economic and Management Sciences (CEMS). Among the main programmes and initiatives addressing sustainable development, green economy and climate change at Unisa are: the Green Economy and Sustainability Engagement Model, the Bioderived Fuels and Solar Technology Transition under Climate Change and Green Economy and Growth, Vice Chancellor's Sustainability Mainstreaming Programme, the College of Economic and Management Sciences (CEMS) Going Green Initiative and CEMS Research Flagships, among them the Climate Change and Green Economy Flagship coordinated from the Exxaro Chair.

About Exxaro Chair in Business and Climate Change at Unisa

Unisa, in partnership with Exxaro Resources Ltd (Exxaro) established the Exxaro Chair in Business and Climate Change (Chair) in 2008 with a life span of three years. Following the Chair's success, Exxaro renewed the Chair's mandate for a further five years to 2015 and rolled it over to 31 December 2018. The vision of the Chair is: To create a Centre of Excellence in Business and Climate Change research, education and advocacy oriented community engagement. Its mission is: To support South African and African stakeholders (including business, government and civil society) in their quest to reduce GHG emissions and adapt to climate change through relevant and cutting edge research, education and advocacy oriented community engagement programmes. The Chair is mandated to operate in three thematic areas namely:

- i. research;
- ii. academic programme development (including training and capacity building);
and
- iii. advocacy oriented community engagement.

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This book is a compilation of blind peer reviewed chapters from an inaugural International Conference on Innovation for Sustainability under Climate change and Green Growth/Economy. The conference took place at the Birchwood Hotel in Boksburg in South Africa from 26 to 28 May 2015. More than 400 participants from across the world took part in this three-day event hosted in the Ekurhuleni Metropolitan Municipality. The book is a direct product of the Exxaro Chair in Business and Climate Change hosted by the Institute for Corporate Citizenship (ICC) at Unisa. The ICC falls within the College of Economic and Management Sciences (CEMS). Among the main programmes and initiatives addressing sustainable development, green economy and climate change at Unisa are: the Green Economy and Sustainability Engagement Model, the Bioderived Fuels and Solar Technology Transition under Climate Change and Green Economy and Growth, Vice Chancellor's Sustainability Mainstreaming Programme, the College of Economic and Management Sciences (CEMS) Going Green Initiative and CEMS Research Flagships, among them the Climate Change and Green Economy Flagship coordinated from the Exxaro Chair.

About Exxaro Chair in Business and Climate Change at Unisa

Unisa, in partnership with Exxaro Resources Ltd (Exxaro) established the Exxaro Chair in Business and Climate Change (Chair) in 2008 with a life span of three years. Following the Chair's success, Exxaro renewed the Chair's mandate for a further five years to 2015 and rolled it over to 31 December 2018. The vision of the Chair is: To create a Centre of Excellence in Business and Climate Change research, education and advocacy oriented community engagement. Its mission is: To support South African and African stakeholders (including business, government and civil society) in their quest to reduce GHG emissions and adapt to climate change through relevant and cutting edge research, education and advocacy oriented community engagement programmes. The Chair is mandated to operate in three thematic areas namely:

- i. research;
- ii. academic programme development (including training and capacity building);
and
- iii. advocacy oriented community engagement.

Details regarding each of the thematic areas are provided in the following sections.

The research arm of the Chair explores trans-, inter- and multi-disciplinary studies both within and outside Unisa. The cutting edge research is placed in the public arena, stimulating public debate, leading to the development of good practices for businesses as well as serving as a catalyst for new climate change policy development and industry practices. The Chair continues to focus on publishing research in the form of relevant reference books, book chapters, academic journal entries, popular articles and conference proceedings. The *academic programme development arm* of the Chair promotes undergraduate and postgraduate learning through shared teaching in a third year level module dealing with Corporate Citizenship. New courses and materials will be developed as appropriate, especially at undergraduate and honours levels. The Chair is also involved in trans-, inter- and multi-disciplinary higher degrees supervision up to the doctoral level. Through the academic programmes, the Chair therefore aims to: increase the number of professionals in business and climate change; increase the business and climate change body of knowledge; advocate and raise awareness on the impact of business and climate change concepts and paradigms; and associates itself with initiatives aimed at building capacity on business and climate change through extended networks and partnerships in the specified field. The Chair continues to be involved in both internal and external *advocacy oriented community engagement* with stakeholders dealing in business and climate change issues. Public lecture series are regularly organised to facilitate information and research findings dissemination.

In terms of governance, the Chair resides in the Institute of Corporate Citizenship (ICC) hosted by the College of Economic and Management Sciences under the auspices of the Executive Dean. While the Chair's autonomy will be safeguarded, he/she will be guided by an *Advisory Board* with nominated representatives from Exxaro, the business sector, civil society, government, and representatives from Unisa. The Advisory Board meets at least twice per annum and advises the Chair on issues of relevance and direction with regard to the Chair's mandate.

This book is the sixth in the series from the Exxaro Chair. Other published books in the series are: *Climate Change: A Guide for Corporates* (2009), *Green Economy and Climate Mitigation: topics of Relevance to Africa* (2011), *Breakthrough: Corporate South Africa in Green Economy* (2014), *Land Grabs in a Green African Economy: Implications for Trade, Investment and Development Policies* (2014), and *Climate Change Education in the SADC School Curriculum* (2015).

About the HSRC

The HSRC was established in 1968 as South Africa's statutory research agency and has grown to become the largest dedicated research institute in the social sciences and humanities on the African continent, doing cutting-edge public research in areas that are crucial to development. Its mandate is to inform the effective formulation and monitoring of government policy; to evaluate policy implementation; to stimulate public debate through the effective dissemination of research-based data and fact-based research results; to foster research collaboration; and to help build research capacity and infrastructure for the human sciences. This mandate is delivered through large-scale, policy-relevant, social-scientific research for public sector users, NGOs and international development agencies. Research activities and structures are closely aligned with South Africa's national development priorities. The HSRC's integrated research programmes provide single points of entry – complete with a critical mass of researchers – for interdisciplinary and problem-orientated research. This research is conducted under a number of research programmes.

The Africa Institute for South Africa (AISA) (the base of the co-editor) is one of the think tank and research divisions of the HSRC. Its research focuses on political, socio-economic, international and development issues in contemporary Africa. The Institute conducts research, publishes books, monographs and an accredited quarterly journal. It also holds regular seminars on issues of topical interest. It is also home to one of the best library and documentation centres world-wide, with materials on every African country.

List of Abbreviations

AACA	=	Addis Ababa City Administration
AAS	=	Atomic Absorption Spectroscopy
AAWSA	=	Addis Ababa Water and Sanitation Agency
AFP	=	Agence France-Presse
AP	=	Associated Press
AR4	=	4th IPCC Assessment Report
AR5	=	5th IPCC Assessment Report
ATA	=	Agricultural Transformation Agency
AU	=	African Union
BAU	=	business as usual
BBC	=	British Broadcasting Corporation
BOD	=	biological oxygen demand
BPO	=	Business Process Outsourcing
CAMPFIRE	=	Communal Areas Management Program for Indigenous Resource
CCD	=	Convention to Combat Desertification
Cedefop	=	Centre for the Development of Vocational Training
CEO	=	Chief Executive Officer
CITES	=	Convention on International Trade in Endangered Species
CMS	=	Convention on Migratory Species
COD	=	chemical oxygen demand
CoGTA	=	Cooperative Governance and Traditional Affairs
COP	=	Conference of Parties
CPR	=	common property resource
CRGE	=	Climate Resilient Green Economy
CSF	=	critical success factor
DAFF	=	Department of Agriculture Forestry and Fisheries
DESD	=	Decade of Education for Sustainable Development
DFI	=	Development Finance Institution
DHA	=	Department of Home Affairs
DHET	=	Department of Higher Education and Training
DO	=	dissolved oxygen
dti	=	Department of Trade and Industry
EAC	=	East African Community
EDD	=	Economic Development Department
EIA	=	environmental impact assessment
ELB	=	Epworth Local Board
EMA	=	Environmental Management Agency

List of Abbreviations

ENCA	=	eNews Channel Africa
EPA	=	Environmental Protection Agency
ESD	=	education for sustainable development
EU	=	European Union
FAO	=	Food and Agriculture Organisation
FET	=	Further Education and Training
FTLRRP	=	Fast Track Land Reform and Resettlement Programme
GDP	=	gross domestic product
GER	=	Germany
GHG	=	greenhouse gas
GNP	=	gross national product
GPS	=	Global Positioning System
HHs	=	households
IDC	=	Industrial Development Corporation
IDS	=	Institute of Development Studies
IISD	=	International Institute for Sustainable Development
IOL	=	Independent Online
IPAP	=	Industrial Policy Action Plan
IPCC	=	Intergovernmental Panel on Climate Change
KII	=	key informant interviews
LDC	=	Least Developed Countries
LED	=	light-emitting diode
MDG	=	Millennium Development Goal
MEC	=	Minerals Energy Complex
MinMec	=	Minister Member of Executive Council Meeting
NAMPA	=	Namibia Press Agency
NDP	=	National Development Plan
NEMA	=	National Environment Management Act
NERSA	=	National Energy Regulator of South Africa
NGO	=	non-government organisation
NGP	=	New Growth Path
NIE	=	New Institutional Economics
NRM	=	natural resources management
NYC	=	New York City
OECD	=	Organisation for Economic Cooperation and Development
PlaNYC 2030	=	Growth and Sustainability Plan for New York
ppm	=	part per million
R&D	=	research and development
RDC	=	Rural District Council
REC	=	regional economic commission
RED	=	reducing emissions from deforestation

REDD	=	reducing emissions from deforestation and forest degradation
REDD+	=	Reducing Emissions from Deforestation and Forest Degradation plus
SA	=	South Africa
SABC	=	South African Broadcasting Corporation
SADC	=	Southern Africa Development Community
SALGA	=	South African Local Government Association
SAPA	=	South African Press Association
SDG	=	Sustainable Development Goal
SOI	=	sustainability-oriented innovation
Solar CST	=	Concentrated Thermal
Solar PV	=	Solar Photo-Voltaic
SPSS	=	Statistical Package for Social Science
STELSA	=	Steel and Engineering Industries of Southern Africa
SWH	=	solar water heating
SWM	=	solid waste management
TDS	=	total dissolved solids
UB	=	Universität Bremen (Bremen University)
UCT	=	University of Cape Town
UN DESA	=	United Nations, Department of Economic and Social Affairs
UNCBD	=	United Nation Convention on Biological Diversity
UNCED	=	United Nations Conference on Environment and Development
UNDP	=	United Nations Development Programme
UNECA	=	United Nations Economic Commission for Africa
UNEP	=	United Nations Environment Programme
UNESCO	=	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	=	United Nations Framework Convention on Climate Change
UNWTO	=	United Nations World Tourism Organisation
US	=	United States (of America)
USAID	=	United States Agency for International Development
VIDCO	=	Village Development Committee
WADCO	=	Ward Development Committee
WBCSD	=	World Business Council for Sustainable Development
WCED	=	World Commission on Environment and Development
WRM	=	water resources management
WSSD	=	World Summit on Sustainable Development
ZANU-PF	=	Zimbabwe African Union Patriotic Front
ZBC	=	Zimbabwe Broadcasting Corporation
ZELA	=	Zimbabwe Environmental Lawyers Association

PART I

Introduction and Context

Sustainability, Climate Change and Green Economy Transition

Contextual Settings

Godwell Nhamo

INTRODUCTION

This book brings together discourses involving sustainability, climate change and the green economy transition agenda. Although having been in existence for a considerable period of time, the identified concepts remain contested in academic and professional disciplines, given the constant innovation in this space. The book therefore addresses both the old and new thinking on the concepts, thereby adding to the knowledge pool and helping to refine understanding.

Innovation is probably what the world needs (now and in the future), in a time of global change that has resulted in multiple crises, such as environmental degradation, biodiversity loss, climate change, energy crisis, financial crisis, water stress and governance poverty. The ubiquitous climate change and green economy (including green growth) debates are proof of a world that has yielded to scientifically based suggestions for the need to minimise, if not eliminate, the anthropogenic drivers of environmental decay and climate change. Suggestions to that end call for an unusual approach that also realises the contributions that local and indigenous knowledge bring to the solutions table. The transition to a green economy demands a structural shift that seeks the abandonment or minimisation of old and dirty technologies and processes in favour of new and greener technologies and processes, which are premised on a low carbon and resource-efficient growth trajectory.

Capturing the pecuniary value of the green economy transition is a function of the ability to innovate in terms of products, technologies, processes and practices across the entire range of economic, social and environmental activities. These need to involve enterprise at all levels – from the grassroots level to large corporations. Innovation that introduces new approaches to produce, utilise and manage key resources (such as energy, carbon, water and other materials) is inevitable. Equally important are new approaches to

managing post-production processes and the waste produced by the use of end products. Taken together, these new approaches, designs and innovative ways present multiple game changers for the green economy and climate-compatible transition process.

The quest for the long-term strategic global goal to attain sustainable development has prompted a re-assessment of innovation and technological change.¹ However, for the reader to gain a clear understanding of key issues debated in this book, these will be unpacked accordingly.

TOWARDS GREEN INNOVATION

Gaziulusoy² maintains that in order to achieve sustainability, the world should fulfil the requirements that lead to socio-technological transformation. The key areas requiring such transformation are the production and use of energy, modes of mobility and food production, since these primarily impact social functioning. On the other hand, eco-innovation that embraces eco-designs and cleaner production have been on the global platform for a while – ever since the publication of the Brundtland report in 1987 entitled ‘Our Common Future’.³ Other developments aligned to this thinking include the concept of sustainability-oriented innovation (SOI). Such SOI is described by Klewitz and Hansen as ‘the integration of ecological and social aspects into products, processes, and organisational structures’.⁴ The SOI links well with the concept of sustainability transition, which focuses on long-term and multi-dimensional change processes that aim to shift society from unsustainable to sustainable modes of production and consumption.⁵

Coming from a corporate perspective, Staub et al.⁶ define innovation as ‘the implementation of a new or significantly improved product, goods or service or process, a new marketing method, or a new organisational method in business practices, workplace organisation, and external relations’. Associated with green innovation is the concept of open innovation (interchanged with crowdsourcing or co-creation). Open innovation is defined as ‘a way for companies to utilise the ideas and strength of the people outside their organisation to make improvements in the internal processes or products’.⁷

Three main stages of innovation are visible in the literature, namely: (1) concept design; (2) development phase; and (3) the implementation phase that also includes diffusion, deployment and upscaling. The phase-out stage is not commonly spoken about, but this can be identified as the fourth stage. In addition, the three stages are linked to process, organisational and product innovations.⁸ Coming closer to matters addressed in this book, Uyarra et al.⁹ focus on low carbon innovation and enterprise development in the United Kingdom. The authors found that without proper low carbon innovation policy, uncertainty is created, which hinders private sector and other stakeholder engagement in that space. Low carbon development and growth remain a fundamental transition pillar towards addressing climate change and transitioning to a greener global economy, now and into the future.

However, in order for a complete revolution on green innovation to take place, policies (white papers, regulations, laws, directives, orders, etc.) that promote green innovation are necessary. Such policies may include environmental regulations, support for research and development, commercialisation, financial (dis)incentives and market development.¹⁰ What is critical then is the manner in which a policy mix is packaged for the best possible outcome that inspires green innovation.¹¹ The authors also focus on low carbon technological innovations in the United Kingdom and Finland and found that light-emitting diode (LED) lighting and new green building designs were good green innovations to take into account. Other innovations that emerged included those of a social nature, like work and shopping car clubs, teleworking and home offices that result in reduced carbon emissions. Mjimba¹² considered innovation for sustainable electricity supply in Nigeria and South Africa. The main findings were that although there is limited innovation capacity in as far as technology is concerned, both countries could exploit adaptation (Nigeria) and commercial scale-up (South Africa) innovative modes. This is the case since innovation is 'context-based and not all economies have adequate stock of hard and soft infrastructure to participate in cutting-edge high-rent innovations'.¹³

Green innovation that involves radical technological innovations remains relevant in our society. However, such radical technological innovations, which result in sustainability, usually meet high barriers, since these need socio-technological transitions and acceptance.¹⁴ The Boeing's Dreamliner is a case in point. The Boeing 787 made its inaugural commercial flight from Tokyo to Hong Kong on 26 October 2011 and set a new fuel efficiency standard. This aircraft contains a number of innovative technologies, among them light-weight material.¹⁵ This kind of innovation fits into the new paradigm of design for sustainability.¹⁶ As the world continues on its low carbon development path, news of exciting green innovations, especially in the renewable energy sector, continues to filter through on various platforms. Green innovation is growing in tourism, manufacturing, education, oil and gas, information communication technology and many other sectors.

CLIMATE CHANGE AND SUSTAINABILITY

Climate change is a concept traditionally associated with the discipline of Geography and was studied under the topic 'Climatology'. Over the years, understanding of the concept has shifted remarkably, from it being a nice-to-know to it being a 'must'-to-understand. This is mainly due to the negative impacts associated with the changing climate, which can result in extreme weather events, such as drought, floods, heavy snow, hailstorms, extreme cold, wild fires, heat waves, extreme fog and mist, and many more. Climate change has become everybody's business, and for corporates, climate change presents various forms of risks, among them: reputational, regulatory, physical, competition and financial risks. From a political perspective, failure to understand and address climate change may lead to the end of a career as many voters now understand the impact of the

changing climate on their livelihoods (particularly those from the developed countries). As such, innovation for sustainability under climate change and green economy is no longer a nice-to-have, but rather, a necessity for survival.

CLIMATE CHANGE SCIENCE

What is climate change? This is probably a good starting point when considering climate science. Readers should bear in mind that this book is written from the perspective that the world has come to a consensus that climate change is real. Hence no space will be devoted to debate or to discussing different views on this issue from different schools of thought. From the literature, twin definitions are commonly cited: one from the Intergovernmental Panel on Climate Change (IPCC) and the other from the United Nations Framework Convention on Climate Change (UNFCCC). The definition from the IPCC places emphasis on nature as the main driver of climate change, yet the UNFCCC places more weight on human activities as the main driver of the changing climate. The UNFCCC defines climate change as ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’.¹⁷ In the Fourth IPCC Assessment Report (AR4), the IPCC says climate change is related:

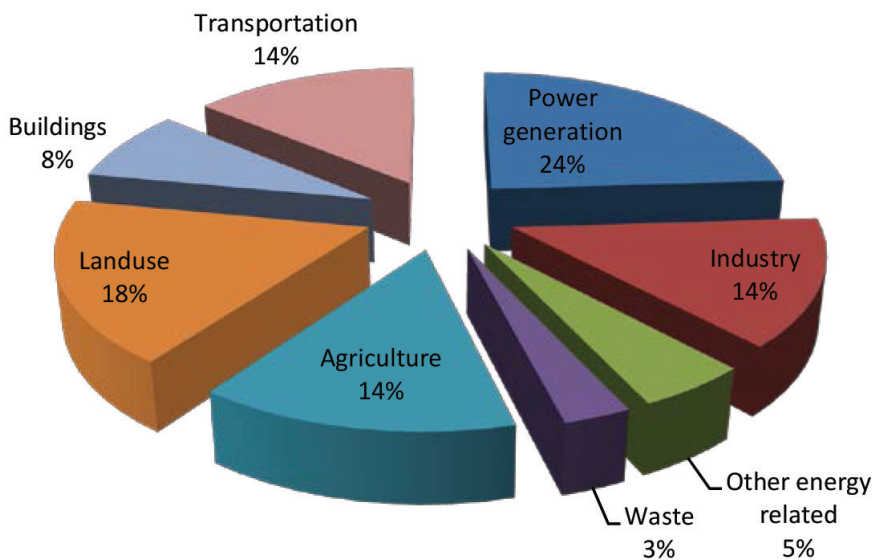
... to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that it persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity.¹⁸

Other scientific terms of importance include: climate system, emissions, greenhouse gases (GHGs), reservoir, sink and source. Readers are encouraged to familiarise themselves with these and other terms. From the AR4 report, the IPCC and other global players put to rest any debate on the question: Is climate change taking place and who is contributing most to the phenomenon? The AR4 report unequivocally concluded that climate change was and is still taking place and that the major source of the GHGs that result in global warming and climate change is mainly anthropogenic, rather than natural.¹⁹ Given this scenario, global leaders, including captains of trade and industry, need to do something, and do it quickly, in order to avoid further uncontrolled GHG emissions. The findings from the AR4 report show that global average surface temperatures rose sharply between 1850 and 2000; the Northern Hemisphere snow cover is melting; and global average sea levels rose significantly.

In an independent review commissioned by the Chancellor of the Exchequer, Sir Nicholas Stern,²⁰ the conclusion was that the scientific realm of knowledge had adequate evidence supporting climate change as a very serious global risk that required immediate

global intervention. In summing up the negative impacts of this global crisis, Sir Stern wrote: 'Climate change presents a unique challenge for economics: It is the greatest and widest-ranging market failure ever seen'.²¹ When one talks of markets and market failure, it becomes difficult to exclude business. Hence, the future role of business in addressing climate change remains anticipated by responsible global citizens. After all, the hand of business is seen as having played a major role in causing climate change in the first place. The review encouraged a long-term approach to resolving the climate change crisis by all key stakeholders, including governments, corporates, organised labour, shareholders, communities and individuals. The promotion of stable pricing mechanisms in carbon markets, developing and deploying clean energy and other technologies, and enhancing adaptation in developing countries, were among some intervention measures outlined. Acting then and acting now against climate change were encouraged. As at 2000, the sources of GHG emissions were as depicted in Figure 1.1.

Figure 1.1: Percentage of GHG emissions by source in 2000



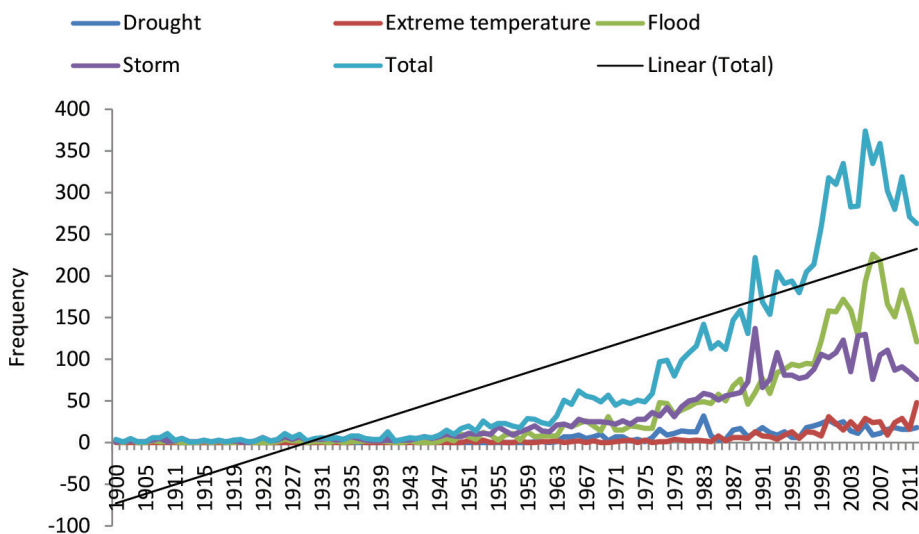
Source: Author (data from Stern)²²

Figure 1.1 provides the science basis upon which action to reduce harmful GHG emissions may be taken. The percentages indicate the share of GHG emissions from the different economic sectors. Hence corporates engaging in programmes and projects aimed at reducing their GHG emissions will know which sectors to address in order that the highest impact can be realised.

Science has gone further to calculate the amount of carbon dioxide equivalent in the atmosphere. From the Sir Stern Review, the concentration of GHGs in the atmosphere

was equivalent to 430 parts per million (ppm) of carbon dioxide equivalent in year 2000. This figure reflected a sharp rise from 280 ppm prior to the industrial revolution.²³ Such concentrations of GHGs in the atmosphere led to the world temperature rising by half a degree Celsius (and this is no small number in terms of temperature records). The worrying fact was that holding the flow of GHGs at 2000 levels would still result in an increase in concentrations of carbon dioxide in the atmosphere to 550 ppm by 2050. This trajectory suggested a global temperature rise of two degrees Celsius by 2050, which would have devastating consequences for the world. If the world were to follow the business as usual (BAU) approach from 2000, there would be a 50 per cent risk of temperatures rising by more than five degrees Celsius by the turn of the century, as indicated by Sir Stern.²⁴ Prior to this breakthrough work, the United States (US) presidential candidate, Mr Al Gore, had raised great awareness on climate change through his book and movie, 'A global warming', which appeared in 2006.²⁵ Ample evidence exists that the climate has been changing and extreme weather events have been on the rise during the period 1900 to 2002, as illustrated in Figure 1.2.

Figure 1.2: Global trends in selected natural disasters



Source: Nhamo²⁶

The World Meteorological Organisation²⁷ mentions that the first decade of the twenty-first Century has been the hottest since the 1850s. The decade also recorded 'above-average precipitation, including one year – 2010 – that broke all previous records'. The main GHG emission figures – for methane, carbon dioxide and nitrous oxide – also rose significantly. It is no secret that, for many years, scholars have written contradictory papers on the existence of climate change. However, the trends in global temperature further reflect

similar upward trends in extreme weather events like droughts, heat waves, floods and storms. The AR5 IPCC report of 2014 contains further scientific evidence.²⁸

When dealing with climate change, one needs to identify the twin pillars thereof, namely: climate change adaptation and climate change mitigation. In addition to the twin pillars, there are other crosscutting aspects that one also needs to understand, including, financing, technology, capacity development, education and awareness, as well as national communication. Climate change adaptation has to do with societies learning to adjust to the negative impacts of climate change. This covers aspects like learning to manage and live with extreme floods, drought, wild fires, boreholes, rivers and wells drying up, extreme snow and disappearing ice caps on top of Mount Kilimanjaro in Tanzania, etc. Given that the business sector has not established a clear business case for getting involved and investing in climate change adaptation, this agenda has remained largely a central government responsibility and the responsibility of other social movement organisations. Climate change mitigation deals with the need to reduce harmful GHG emissions and since many mitigation activities, like renewable energy, energy efficiency and associated technology, present business opportunities, significant investment has taken place in this space.

CLIMATE CHANGE IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

In the past, the world failed to address key issues in the sustainable development space, especially the need to adapt to and mitigate against climate change. Climate change is certainly one of the most pressing challenges humanity has faced, is facing and will continue to face in the future. Never before has the world witnessed general consensus regarding environmental decay, and specifically climate change. At the Rio+20 Summit held in Rio de Janeiro in June 2012, climate change emerged as one of the key matters discussed. Leaders attending the Rio+20 Summit made clear reference to the linkages between sustainable development and climate change and indicated that they recognised:

... the importance of the three Rio conventions for advancing sustainable development, and in this regard we urge all parties to fully implement their commitments under the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification.²⁹

Special mention was made that we are facing severe drought and/or desertification, for example on the African continent. Leaders at the Rio+20 Summit further acknowledged climate change as a cross-cutting issue that needed urgent and ambitious action.³⁰

Regardless of progress made by business in addressing the negative impacts of climate change, the Chief Executive Officer (CEO) of the World Business Council for Sustainable Development (WBCSD), Mr Peter Bakker, noticed a gap, i.e., the outcomes determined

during Rio+20 were inadequate to put the world on a sustainability pathway.³¹ As such, business had to take action and offer solutions to save the world, including addressing climate change. Over 1 000 business representatives attended the Rio+20 Summit and, from Bakker's view, this was done in good faith. Of the 1 000 representatives, 200 CEOs attended the WBCSD organised Business Action for Sustainable Development Conference. Responding to criticism that business was not doing enough to address matters of sustainable development, Bakker had this to say:

[T]here is no point in saying business is not doing its best or some are trying to sabotage change. Life is very simple in my mind: there are good people and bad people and good corporates and bad corporates.³²

Bakker correctly highlighted that the time for CEOs to proclaim progress in addressing climate change after creating awareness on sustainable development matters was over. In his view, if a CEO or a business were not aware of their sustainability responsibility as of June 2012, they did not qualify to call themselves global leaders. The time had come for scaling up sustainable business solutions to save Mother Earth. 'In the past we would all work hard to write a brilliant report and then thought the job was done. Now, if we write a report, that's when the project starts', said Bakker.

Addressing climate change has become a big issue on the global and African Union (AU) agenda. For example, there are now four main documents that magnify the need to move faster, namely: the Sendai Framework for Disaster Risk Reduction for 2015-2030 that was finalised in March 2015;³³ Africa Agenda 2063;³⁴ the means of implementation or financing for development outcomes document known as the Addis Ababa Action Agenda concluded in July 2015;³⁵ and Transforming our world: the 2030 Agenda for Sustainable Development that includes the Sustainable Development Goals (SDGs) concluded in September 2015.³⁶ Business is also referenced in these documents.

The Sendai Framework focuses on addressing climate change as a key driver of disaster risk, with the adaptation agenda coming out strongly.³⁷ In the Africa Agenda 2063, climate change adaptation is prioritised over climate change mitigation. The continent focuses on building capacity and skills across disciplines to ensure that the implementation of climate change coping strategies are carried out, especially as related to vulnerable groups like women, children, youth and people living with disabilities.³⁸ African leaders also emphasise the need to develop national climate change adaptation plans. Africa Agenda 2063 further embraces business as a partner in the process of domestic mobilisation of the resources needed to address climate change and move closer to attaining sustainable development.

The Addis Ababa Action Agenda indicates that climate change and other environmental risks threaten to reverse development gains made in the past if actions to halt further degradation are not adequately financed.³⁹ The Agenda includes the promotion of inclusive and sustainable industrialisation to effectively and efficiently address global

challenges, among them, climate change. Domestic mobilisation of resources, including human and financial capital is outlined as part of the means of implementation.

In the 2030 Agenda for Sustainable Development, climate change is recognised as ‘one of the greatest challenges of our time and its adverse impacts undermine the ability of all countries to achieve sustainable development...’ The survival of many societies, and of the biological support systems of the planet, are at risk.⁴⁰ In Sustainable Development Goal (SDG) 13, global leaders agreed to ‘take urgent action to combat climate change and its impacts’.⁴¹ Climate change also features in other SDGs as a target. For example, in its focus on ending hunger, achieve food security and improve nutrition as well as promote sustainable agriculture, SDG 2 stipulates that there is a need to strengthen adaptation capacity for climate change. Associated extreme weather events, like drought and floods, are also mentioned. SDG 11 calls for the need to make cities and human settlements inclusive, safe, resilient and sustainable and contains a target that focuses on making these cities and settlements climate resilient.

What is of interest in the documents discussed is that they acknowledge that the UNFCCC is the main international, inter-governmental and multi-lateral platform for addressing and negotiating global climate change governance.

GREEN ECONOMY: THE DISCOURSE CONTINUES

Green economy debates (including green growth) have peaked since the global financial meltdown in 2008. The most cited definition of the green economy is probably that provided by the United Nations Environment Programme (UNEP) in 2011. The UNEP defines a green economy as ‘one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive’.⁴² Nhamo⁴³ sees the green economy discourse playing out across all spatial spheres at global, continental, regional, national and local government levels. At all these spatial scales, a green economy can be viewed as a means to attaining sustainable development (on the one hand) and as an end in itself (on the other).⁴⁴ In addition, mainstreaming a green economy into policies and economic sectors is becoming an important feature for the future.⁴⁵

Viñuales⁴⁶ cautions that there are too many disparate initiatives that are being padded under the sustainable development banner. As such, the sustainable development concept no longer provides an adequate platform upon which the major global challenge of environmental decay and governance can be addressed. The major challenge identified has been the implementation gap. Drawing from Viñuales’ view, one is consoled in that the green economy as a means for implementing sustainable development provides an answer to this implementation gap. On the other hand, the interest demonstrated by global

leaders in September 2015, when the SDGs were ratified, indicates that the sustainable development paradigm has regained the necessary political buy-in.

In his article *The New 'Passive Revolution' of the Green Economy and Growth Discourse: Maintaining the 'Sustainable Development' of Neoliberal Capitalism*, Wanner⁴⁷ concedes that there are inherent conflicts and contradictions in the green economy discourse that is also based on green growth. The contradictions come in the form of a myth that human beings can decouple growth from the natural environment, emissions and resource consumption and depletion. Wanner then concludes, 'Greening the economy and associated strategies of green growth divert attention from the social and political dimensions of sustainability and issues of social and international justice'.⁴⁸ In this way, the narratives become the new 'passive revolution' to maintain capitalist dominance. Hence the world is still witnessing the dominance of economic development over other forms of sustainable development pillars like the social and environmental pillars, taking the world back to the unsustainable ways of the 1960s. There is a growing chorus that focuses on green growth and views it as a silver bullet that will help to solve all social, environmental, economic and technological problems. This narrative is problematic, and in the context of this book, we view green economy and green growth not as one way but many ways of attaining sustainable development.

Ferguson⁴⁹ proposes that there is a need to separate green growth from green economy, and also to bring alternative indicators of development and growth to the GDP narrative. Mjimba⁵⁰ argues for the development of industrial policies that move developing nations towards a green economy transition. The author sees 'merit for a temporal and scope limited green industrial policy regime as a plausible route to green industrialisation in developing countries'.⁵¹ Mjimba's arguments align to the emerging thinking at the United Nations Economic Commission for Africa (UNECA) that led to the release of a report titled 'Greening Africa's Industrialisation' in 2016. In the report, UNECA⁵² maintains that there is a need for structural transformation of the continent's economies, which can be done through industrialisation. This call is made based on the triple development agendas, namely: Africa Agenda 2063, the SDGs and the Paris (Global Climate Change) Agreement of 2015. Green industrialisation is viewed as a plausible alternative economic pathway.

UNECA⁵³ further calls for energy efficiency, development in renewable energy (e.g. solar, wind, geothermal and hydropower), as well as decoupling intensive resource use from output growth. In UNECA's view, Africa should take a regional approach to greening infrastructure and industrial structures. Greening Africa's industrialisation further means that the continent should move from wasteful and inefficient production systems, which lead to natural capital decay, to those that yield 'sustainable and inclusive growth, creating jobs while safeguarding the productivity of natural resource assets'.⁵⁴ Hence green industrialisation remains a pre-condition to sustainable development, and equitable and inclusive growth. It is now business unusual for the continent! UNECA concludes by indicating that there is a growing realisation and commitment by African leaders to pursue inclusive green development, and cities are part of this mission. However, in order for this

vision to be realised, there is a need for long-term, consistent and clear policy signals and direction from governments and regional economic commissions (RECs). Hence UNECA envisages an about-turn, rather than a slight tweaking, of existing policy frameworks. Through greening industrialisation, the prevailing supply chains, particularly those in the natural resources sector, should be converted into value chains that lead to value addition. The Africa Mining Vision is cited as a good example in this regard. Drawing from the Paris Agreement, UNECA concedes that building African green economies means that the continent should follow a low-carbon and climate-resilient pathway. Such a climate-compatible development and growth path are now inevitable.

After examining three landmark reports from leading international organisations (the UNEP (Towards a Green Economy), World Bank (Inclusive Green Growth) and the Organisation for Economic Co-operation and Development (OECD) (Towards Green Growth)), Borel-Saladin and Turok⁵⁵ refuted claims that the green economy narrative is 'green-washing' and a tweak of the conventional economic paradigm. In their view, the 'green economy has the potential to effect substantive and transformative change towards the goal of sustainable development'.⁵⁶ Needless to say, the green economy story-line remains emerging⁵⁷ and is yet to be grasped fully by industry, government and labour, especially in emerging economies.

In examining the green economy transition in South Africa, Death⁵⁸ comes up with four discourses on the green economy, i.e. green economy as revolution, transformation, growth and resilience. However, in his conclusion, the author indicates that there is a need to disaggregate the green economy concept in order to identify overlapping, and sometimes contesting, discourses across the four discourses. In a similar fashion, Faccar et al.⁵⁹ draw up what they call three emerging discourses on the green economy, i.e. incrementalist, reformist and transformative discourses.

As readers go through some of the chapters in this compilation, it will emerge that various authors tap into some of the discourses presented here to address a number of topics, including: green jobs, tourism, wildlife management, wetlands conservation and sustainable development. The next section presents an outline of the book.

BOOK CHAPTER OUTLINE

This book comes in six parts, made up of 14 chapters in total. Part 1 is made up of a single chapter that covers the context of sustainability, climate change and the green economy transition agenda. Part 2 looks at a green economy and green jobs. The three chapters in this part all focus on South Africa and deliberate on a green economy and the challenges of government coordination, socio-economic developments and green jobs, and green economy readiness, with an emphasis on skills and the immigration regime in the country. Part 3 reflects on sustainable development. The two chapters in this section present a debate on relearning our wants and needs for sustainable development and

a critical reflection on engineering for sustainable development. Natural resources and wetlands management make up Part 4 of the book. Four chapters are included, which tease out: timber harvesting as a source of economic development in Zimbabwe, institutional dynamics of Mopane woodland management in Zimbabwe, and challenges and opportunities in addressing the environment-economic growth conflicts in Ethiopia. An analysis of water quality in wetlands in Zimbabwe is also included. A critique of climate change coverage in news media, mainstreaming climate change into wildlife policies in east and southern Africa, as well as mitigation and adaptation of tourism to climate change in sub-Saharan Africa, are three chapters in Part 5 of the book, which focuses on climate change, tourism and wildlife matters. The last part of the book (Part 6) is made up of another single chapter that articulates emerging issues from the whole book, and presents some policy and take-home messages.

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PART II

Green Economy and Green Jobs

2

The Green Economy

The Challenge of Government Coordination in South Africa

Ivor Sarakinsky

ABSTRACT

The green economy is a new and growing sector in many countries. The motivations for the green economy transition emerge from its environmental, enterprise and employment-creating potential. For these reasons, South Africa has adopted many economic policies in which the green economy has a prominent position. However, the green economy depends on inter- and intragovernmental coordination, as well as the regulatory and ideational innovation that will enable green investments and economic growth. As green economy initiatives require stakeholder and multi-level government participation in decision and implementation processes, the challenge of coordination is a significant variable in the achievement of green economy objectives. Hence this chapter focuses on this challenge.

INTRODUCTION

Under normal circumstances, coordinating government departments, both horizontally and vertically, for the realisation of policy objectives, is difficult. There are many reasons for this. Different priorities, specific budget allocations, regulatory uncertainty, as well as complex intergovernmental and intragovernmental chains of command and communication go some way to explain this. All of these challenges are notable when it comes to implementing green economy policies. At a policy level, the green economy is set out in a number of different documents, with different departments taking custodianship of these. The Industrial Policy Action Plan (IPAP), the New Growth Path (NGP), the National Development Plan (NDP) and the National Climate Change Response White Paper (NCCRWP), for example, inform of the action taken by the Department of Trade and Industry (dti), the Economic Development Department (EDD), the former Planning Commission in the Office of the State President and the Department of Environmental Affairs (DEA). This already hints at the coordination challenge facing green economy

initiatives in South Africa. At a basic level, green economy initiatives aim to drive enterprise and employment creation, as well as economic growth in general, through projects that reduce the South African carbon emission footprint. Instead of viewing carbon emissions in a negative way, the green economy approach sees it as an opportunity to reconfigure the country's economy in a more environmentally sustainable way.

For over a century, South Africa's economy has been described as a Minerals Energy Complex (MEC). Policy, regulatory frameworks and a system of bureaucratic functioning were premised on cheap energy and mining. This economic structure is often described as a 'brown economy', which means that it produces high levels of pollution that damage the environment. Moving from this brown economy to a green economy not only means that the previous system has to be reformed, it also requires a new mode of departmental coordination and cooperation to be developed. The reason for this is that national, provincial and local spheres of government are unable to formulate and implement green economy programmes in isolation. The multi-dimensional nature of the green economy requires diverse departments to cooperate in order to open up and realise the economic and employment-creating potential of this new economic sector. A simple example will suffice to illustrate this point. National, high-level policy and renewable energy requires departments such as DEA, the Department of Water Affairs (DWA), the National Treasury, the dti, the *Department of Agriculture, Forestry and Fisheries* (DAFF), EDD, the Department of Energy, the Cooperative Governance and Traditional Affairs (*CoGTA*) and public enterprises (like Eskom) to develop new land-use regulations that do not threaten food security and the environment, while enabling the growth of this new sector. At provincial level, similar departments have the task of identifying appropriate land while coordinating infrastructure and projects to achieve economies of scale and efficiency. At local level, the land-use permits have to be processed and the bulk supply of resources for particular projects coupled with access to the national electricity grid. Without such vertical and horizontal coordination and cooperation with regard to layers of compliance and problem solving, green economy initiatives might be delayed, become too costly or collapse.¹

METHODOLOGY AND CONCEPTUAL FRAMEWORK: THE GREEN ECONOMY

This discussion of the green economy is informed by a participant observation type methodology. The author was a senior official in government working on the green economy while on secondment from university. As a participant in numerous green economy decision and implementation processes, the author gained valuable insight into the dynamics and challenges in this new economic sector. Moreover, the experiences of working in this policy area support the findings presented in this article. Once back in academia, the opportunity to reflect on such experiences, through teaching and research, enabled the identification of important themes, processes and dynamics relevant to the green

economy realising its developmental potential. Such direct practitioner experience provides insight into the green economy's potential and challenges that is not easily accessible to academicians. This article pursues the theme of green economy coordination in a complex, multi-stakeholder and governmental system for the achievement of policy goals that no single entity is able to achieve alone.

It is much easier to define the brown economy, which entails economic activities with many different types and intensities of environmental externalities. Simply put, carbon emissions produced by burning fossil fuels for energy, coupled with water pollution from acid mine drainage as well as mismanaged waste streams in manufacturing and the inefficient use of energy, pollute the environment. These externalities have costs in terms of their effects and the enforcement of measures to limit their impact. As an alternative, the green economy aims to reduce such externalities through the introduction of new technologies into all the economic sectors, while generating new manufacturing activity in the production and assembly of such technologies.² In this way, the green economy contributes to the mitigation of climate change while catalysing economic development.³ However, transitioning from a brown economy to a green economy entails certain costs that require careful analysis.⁴ It can be said that while green economy initiatives are of high cost in terms of up-front capital requirements, they are more cost effective in the longer term. The tension between short-term capital deployment and longer-term beneficial outcome is, perhaps, the obstacle to its wide-scale realisation when political electoral and policy cycles are of a short-term nature.

It is at this point that the green economy becomes controversial. Initiatives aimed at environmental protection, especially those related to the eradication or beneficiation of alien species of flora, clearly create economic opportunities. At the same time, preserving the environment and expanding ecotourism has significant economic opportunities. However, the green economy, as suggested above, has a more focused objective, i.e. to realign the MEC and thereby green the economy. Thus, the green economy is best seen in the context of industrial and manufacturing economic activities that reinforce a range of other initiatives in the sphere of environmental protection. Indeed, the green economy, as a meaningful economic vision, emerged in the post-2008 global recession.⁵ Many countries increased investment in, and roll out of, new technologies as a means to stimulate a new phase of economic growth, while creating new employment opportunities to mitigate the unemployment resulting from the dramatic economic decline.

Instead of rehearsing the environmental and economic development issues as they relate to sustainable development, environmental protection and the green economy, as set out in the United Nations Environmental Programme's (UNEP) Rio+20 Framework,^{6,7,8,9} it is best to present a broadly accepted definition of the green economy here, which will act as a foundation for the analysis that follows. UNEP, in the Global Green New Deal (GGND), defines the green economy as:

The process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities.¹⁰

This definition calls for integration of elements of the economy and it alludes to the need for coordination between government departments, if such objectives are to be met. 'Reconfiguring business and infrastructure' suggests that supply chains, business processes, waste streams and the provision of bulk services require new modes of implementation. Similarly, 'better return' implies more efficient use of scarce resources, coupled with more effective and efficient use of natural resources, through recycling and resource extraction in waste streams. At a social level, the green economy has to contribute to a reduction in poverty and inequality. Lastly, an important high level objective is the reduction of greenhouse gas (GHG) emissions to mitigate global warming. In this way, the objectives of sustainable development, through environment, economy and equity are addressed. However, the green economy is not just about finding a balance between these key elements – it is about driving economic growth through changing production and consumption processes and patterns. In this way, the green economy might be considered as the mechanism for the realisation of sustainable development.

Lastly, it is necessary to differentiate between the concepts of the green economy and the blue economy, while showing their points of intersection. In the definition above, the phrase 'creating less waste' is important, but does not go far enough. The blue economy concept, as developed by Gunter Pauli, declares that there is no such thing as waste. What we now consider waste, can, with innovative thinking and the application of technology, be transformed into a resource for other production processes and products. A good example of this type of thinking, with special relevance to municipalities in South Africa, is the use of solid waste or sewage to produce methane that is then used for electricity generation or vehicle fuel. Instead of entering the atmosphere and contributing to global warming, methane is harvested and used productively. Similarly, the decomposed sewage is then processed further and used for lawn dressing or even fertiliser. Alas, like so many of the ideas related to the green economy, there is also some ambiguity about the meaning of the term blue economy. In some policy documents relating to Operation Phakisa, blue economy refers to economic development based on the sustainable exploitation of ocean resources. This descriptive use of the term blue economy does not capture the importance of managing waste streams so as to generate materials and resources for further beneficiation. Thus, the blue economy is about a zero waste philosophy and clearly has resonance with green economy thinking and practice.

NATIONAL BUREAUCRATIC SYSTEMS AND THE GREEN ECONOMY IN SOUTH AFRICA

There appears to be consensus in the literature that the state is central to catalysing the green economy.¹¹ While much of the literature examines policy instruments, economic incentives and demand and supply side interventions,^{12,13,14} there is some focus on the mode of politics necessary for transitioning to a green economy.¹⁵ However, in the literature, there is inadequate attention paid to the importance of bureaucratic systems and functioning, and politics, with regard to the green economy and green projects. An exception is a study on intergovernmental relations that was done in the United States of America (US), where it is shown that concerted and coordinated action could reduce GHG emissions by as much as three billion tonnes by 2020, while creating 2.2 million jobs and significant economic growth.¹⁶ The authors go on to state that the majority of these benefits will never be realised due to failure to achieve the required levels of coordination and cooperation in the governmental system. The same challenge prevails in South Africa, where bureaucratic systems and the requirements of green economy growth are extremely complex, due to cross-cutting policy initiatives and interconnected bureaucratic line functions. Again, this complexity as a constraint to the growth of the green economy is not unusual, with studies on governance clearly showing how specific institutional requirements are needed as enablers of climate change and green growth initiatives.^{17,18,19}

In South Africa, the first dimension of green economy bureaucracy is set out in the dti's IPAP. In all its iterations from 2011 to 2015, green initiatives are set out, ranging from energy efficiency to renewable energy component manufacturing. Technologies include solar water heaters, energy efficient motors, renewable energy components and energy efficient buildings. Under each of these technologies there is an implementation plan, with specific responsibilities allocated to other departments, which are identified as either lead or support departments. In this way, IPAP aims to align all necessary departments to the achievement of green economy implementation goals.²⁰

The next relevant policy document is the EDD's NGP.²¹ Here, the green economy is presented as one of five jobs drivers that, with government support and coordinated action, will result in substantial economic growth through the exploitation of novel and niche economic sectors. The specific relationship between the EDD and green economy policy and implementation is complex. On the one hand, the EDD's green economy mandate is set out in Outcome 4 on Economic Growth and Jobs, as well as the aligned Delivery Agreement, as per the Presidency's Outcomes Performance Management System.²² On the other hand, the EDD primarily pursues green economy initiatives through the Industrial Development Corporation (IDC), a development finance institution (DFI) established in 1954, which operates off its balance sheet, rather than through fiscal transfers from government. The Green Business Unit of the IDC invests in green economy subsectors such as energy efficiency, renewable energy, waste management and recycling, biogas, biofuel and biodiesel.²³ Its objective is to absorb risk and fund projects in partnership

with the private sector, in order to kick-start new economic sectors. As a public entity, it is subject to the Public Finance and Management Act and reports to the Minister of Economic Development. Cross-department coordination for IDC projects is addressed by the EDD line function or even directly by the IDC's programme managers.

The green economy is also presented as a priority in the NDP. In setting out climate change adaptation and mitigation policies, coupled with a broad programme for transitioning to a low carbon economy, the NDP accepts the scenarios and coordination mechanisms set out in the DEA's NCCRWP. Apart from short, medium and long term objectives coupled with specific policy initiatives relating to carbon emission taxes, the NDP does not provide detail on the mechanisms for coordinating such complex initiatives in order to achieve a low carbon economy. In this regard, the NDP states, somewhat vaguely, that '[t]his oversight and coordination function at a meta-departmental level is critical. Economic policy departments, in particular, should be appropriately represented and involved in future planning'.²⁴

In terms of South Africa's carbon emissions, which are amongst the highest in the world,²⁵ both the NDP and NCCRWP focus on energy and electricity generation in particular. About 70 per cent of the country's GHG emissions are caused by energy generation.^{26,27} Thus, a dramatic reduction in emissions could be achieved through energy efficiency (burn less coal) and the adoption of new technologies in the nuclear and renewable energy arenas. By raising the cost of using coal, through carbon taxes, the National Treasury is involved in managing the incentives for industry to move from coal into the newer technologies for energy generation. Similarly, through land use changes that require food security and other types of permission, DAFF and CoGTA are involved.

However, energy, especially electricity, is much more complicated than this would suggest in terms of policy and interdepartmental coordination. While the Department of Energy is responsible for policy development through the Integrated Resource Plan for Energy and renewable energy through the Renewable Energy Independent Power Producer Procurement process (REIPPP), the main state-owned corporation that generates the bulk of the country's electricity, Eskom, reports to a different department, namely the Department of Public Enterprises (DPE). Through a different line function, Eskom is responsible for making grid connections available to independent power producers who purchase the power they generate. Eskom also drives a number of initiatives that are directly related to the green economy, namely energy efficiency through subsidised solar water heater and energy efficient lighting installation. This creates a demand for equipment that might be met through local manufacture, as per the mandates of the dti and IDC. This demonstrates the complexity and interconnectedness of departments, DFIs and state-owned corporations in pursuing green economy objectives.

While the DEA is responsible for environmental protection and waste management, including landfill sites, air quality and recycling, it also pursues a number of initiatives that have positive economic benefits, but which are not clearly described as being green economy programmes. Working for Water and Working for Fire are programmes

that ensure that alien vegetation is harvested. This not only creates employment, but it also produces the materials for down-stream beneficiation through, for example, the manufacture of desks for schools. The green economy defined above focuses on business process innovation to reduce carbon emissions while catalysing growth through the development of new economic sectors. Environmental protection, important as it is in enabling indigenous flora to recover while creating employment, is not strictly speaking a green economy initiative. Instead, it is more plausibly considered as a sustainable development initiative that is aligned to processes linked the WSSD in 2002 and South Africa's ongoing participation in related fora. Sustainable development projects focus on environmental protection, while the green economy is about reconfiguring the economy through the use of carbon limiting or neutral technologies that open up new opportunities to manufacture technology components and provide goods and services.

At national level, it is clear from the above that the objectives of the green economy cannot be realised by any single department on its own. IPAP is the only policy with an implementation plan that sets out a detailed reporting structure to achieve such coordination through delegated responsibility. Despite all the other initiatives that state the importance of coordination, monitoring and evaluation to ensure implementation and the realisation of policy goals, there is almost a belief that such coordination will emerge spontaneously, simply by officials from relevant departments attending steering and co-ordination meetings. While the green economy is coordinated at political level through the Economic Cluster, the micro-coordination issues cannot be dictated, nor resolved, through administrative fiat set out in an implementation plan and associated monitoring and evaluation instruments.

For coordination to occur, high level officials reporting to the Economic Cluster, need to be at steering meetings, so as to commit specific departmental resources to the initiative. However, based on observations made as a former practitioner, such officials are hardly ever at such meetings and are more often represented by lower-level officials who do not have decision-making authority and who merely report back to the principal. Moreover, it sometimes happens that the lower-level official who represents a specific department is not always the same person. Thus, the meeting has to spend time updating all the new departmental representatives on the decisions of the last meeting before the next steps can be discussed. All of this is hard to enforce as officials from the necessary support departments are accountable to managers in their home departments and lead department officials have limited, if any, authority over them.

A similar coordination challenge faces IPAP, where tasks are delegated to other departments. Officials in specific line departments have their own priorities to focus on, based on their branch goals and their own performance contracts. As a result, IPAP's implementation plan suffers.

PROVINCIAL GOVERNMENT AND GREEN ECONOMY COORDINATION

If green economy coordination is a challenge at national level, then it is not surprising that the provincial tier of government experiences similar challenges. At one level, provinces participate in national projects that are situated in their geographic area and they are subject to national coordination. An example of this is the large-scale renewable and solar energy projects in the Northern Cape. However, there are other green economy initiatives in each of the nine provinces that aim to foster growth through niche and competitive advantage opportunities. Such projects are formulated and coordinated by the Green Economy Section in the EDD in the provinces.

As the green economy was pronounced as a national priority in successive State of the Nation Addresses between 2010 and 2012, provinces have developed their own green economy plans with a focus on niche segments that are determined by natural resources and infrastructure. Two different approaches to provincial coordination of the green economy can be identified in the provinces. The first, exemplified by Gauteng Province, marks the pursuance of green economy objectives within the Gauteng Department of Economic Development.²⁸ Here, detailed plans and outcomes are set in nine thematic areas. This approach, similar to most other provinces, sees the province as the centre of green economy planning and coordination with other, related, provincial departments. The Gauteng Green Economy Strategy is a horizontal, static plan that sets out desired projects with stated anticipated outcomes, while linking them to specific departments. It is difficult to gather data in order to establish if such an approach has achieved success, partly due to the listing of desirable green projects without budget lines and implementation plans. KwaZulu-Natal (KZN), on the other hand, attempts to drive green initiatives through a provincial Green Economy Office that aims to establish economies of scale by coordinating municipalities.

The Western Cape, on the other hand, pursues a different approach to driving green economy development. It has established Green Cape, a special purpose vehicle in the province, to drive, coordinate and research green economy growth, with a focus on renewable energy component manufacturing.²⁹ Being separate from the provincial government, Green Cape is more like a hub, where the public, private sectors and other stakeholders engage in the formulation and implementation of green economy policy. While the Western Cape and Eastern Cape tend to focus on renewable energy, with an emphasis on wind turbine component manufacture, the Northern Cape focuses on solar photo-voltaic (Solar PV) and concentrated thermal (Solar CST) technologies. Similarly, provinces with a strong agricultural sector aim to diversify through the production of biofuels. In the Eastern Cape, a large production facility, co-financed by the IDC, is currently under construction, which will process sugar beet and sorghum into bioethanol. While these crops do not impact negatively on food security, the provincial government has to coordinate land purchase for farmers and cooperatives to produce material feedstock. While the majority of provinces appear to formulate their green economy strategies based on the

assumption that government intervention will open up this economic sector and draw the private sector in, the Western Cape process seems to include the private sector in the process of conceptualising green economy strategies and projects.

Provinces have a critical role to play in coordinating the green economy, as particular initiatives require economy of scale to attract sustainable investment. Thus, provincial plans for roof-top Solar PV and solar water heaters require buy-in from other aligned municipalities for their success. Such coordination goes beyond these particular examples and includes cross-municipality coordination so as to achieve economies of scale, for example, the conversion of public transport vehicles from diesel to biogas and bioethanol. This means that provinces have a two-fold coordination responsibility. First, the Green Economy Unit has to coordinate with national and other relevant provincial departments regarding the implementation of particular projects. Second, provinces also have to coordinate with the municipalities in their jurisdiction to ensure there is alignment and an efficient permission granting process for projects. Very important in all of this coordination is ensuring an environmental impact assessment study is in terms of the National Environment Management Act (NEMA), which is overseen by the DEA. Without NEMA approval, no project in any of the sectors of the green economy can be implemented. This is especially the case with wind turbines for electricity generation in terms of the migration routes of birds and the presence of bat colonies.

The same coordination challenges occur at the provincial level as at the national level with regard to bureaucratic functioning. What makes the challenges at provincial level more complex is that this is the level of implementation, which brings financial management and budget processes into the equation. Furthermore, when public money is involved, it further leads to oversight in provincial legislatures and the monitoring of projects through portfolio committees and a provincial Standing Committee on Public Accounts. Budgeting for spending on the green economy at provincial level depends on project identification and here each provincial Development Finance Institution becomes involved and increases the complexity of such initiatives. At the same time, oversight of such projects further complicates implementation of green economy projects, as many of them are unique and require complex solutions to be found regarding land use and other regulatory processes aligned to the 'brown' or dirty economy. To achieve this coordination with other provincial, national and municipal departments, as well as other entities, requires highly capacitated and efficient bureaucratic mechanisms.

Perhaps the most important structure for achieving coordination of green economy initiatives at national and provincial level is the regular Minister Member of Executive Council Meeting (MinMec) that is convened by the Minister of Economic Development and the Minister of Trade and Industry. This quarterly meeting brings together the Ministers from the Economic Cluster and the MECs of Economic Development from the provinces, in order for them to ensure alignment of policy and finance through the participation of the IDC. Political heads from the metropolitan municipalities are also invited to the meetings, to ensure that there is coordination across all tiers of government. The MinMec

process has enormous potential for achieving the necessary multi-level coordination already discussed. Before the political heads meet, appointed officials from national and provincial economic departments meet to identify policy issues in setting the agenda for the MinMec. While the MinMec process deals with economic policy generally, between 2010 and 2011 (and probably thereafter), the green economy received significant attention at these meetings.

THE GREEN ECONOMY AT MUNICIPAL LEVEL

While large green economy infrastructure projects, like renewable energy power stations and biofuel plants, are driven through national and provincial processes, the nuts and bolts of the green economy drive exist primarily at the local level. The provision of water and energy, coupled with waste management, means that municipalities are the fulcrum around which green economy development revolves. However, the coordination challenges at local level do not exist at the horizontal departmental level alone. Instead, depending on the issues, municipalities will have to engage national departments directly, while provinces are also important in some instances. In a sense, the sphere of government best placed to drive green economy initiatives is also the sphere with the greatest policy and resource deficits. Municipalities tend to exhibit policy development capacity challenges for innovative green economy initiatives and often lack the fiscal resources for their realisation. While the South African Local Government Association (SALGA) attempts to perform the multiple roles of policy development, knowledge dissemination and municipal coordination, the drive towards a green economy at local level is not fulfilling its potential for a number of reasons.

In terms of waste management, there are numerous opportunities for development, as well as enterprise and employment creation, but national and local regulatory frameworks hinder progress. It is best to illustrate this with some examples. Municipalities have no shortage of sewage and managing this effectively is necessary to prevent environmental degradation and disease. Using sewage as a resource would mark the interconnectedness of the green and blue economies regarding a zero waste philosophy. The private sector would be interested in using available and costly technologies to upgrade sewage reticulation systems, so as to produce methane or natural gas. This gas could then be used to generate electricity, power public transport vehicles and even feed into municipal gas infrastructure. Instead of methane – which is a potent GHG – entering the atmosphere and contributing to global warming, it could be harnessed. At the same time, biodegraded sewage sludge could be used for fertiliser, especially for non-food crops like lawn dressing. While contributing to energy at municipal level, harvested biomethane enables the delinking of transport or energy-generation fuels from global oil and coal prices. Regulations on access to waste and municipal infrastructure, coupled with complex policies on public private partnerships, make such projects difficult to initiate.

Unless municipalities are proactive, entrepreneurs can only use the unsolicited bid section of the municipal regulations to gain access to existing infrastructure for the roll out of such projects (Municipal Finance Management Act Section 120 (7); Municipal Supply Chain Regulations Section 37). Entrepreneurs with innovative technologies and business plans might not be prepared to negotiate all the hurdles and jump through all the hoops, as well as disclose market sensitive information to competitors, through this process. As green economy opportunities require innovation, as they are often incompatible with existing regulations, many viable and beneficial projects are lost. So opportunities for converting vehicles to run on compressed natural gas, the manufacture of the components and their fitting, are lost. This technology is well established in many cities where public transport vehicles use biogas. In South Africa, there is a small pilot project in the City of Johannesburg that harvests biogas from vegetable waste obtained from the produce market. It is a partnership between a private sector company, taxi operators, the City and the IDC, and it operates on a limited route. This suggests that biogas is a feasible and reliable alternative energy source for public transport and the project could be up-scaled through the harvesting of biogas from landfills and municipal sewage works. Similarly, lost energy generation opportunities mean that municipalities are unable to diversify their grids by generating power from biogas. Such energy will make them less dependent on Eskom.

Further green economy opportunities exist at municipal level with regard to recycling. Dumping waste in landfills is becoming increasingly problematic, as the DEA has strict regulations regarding the opening up of new sites. This means that existing landfills have to last much longer than initially planned. The easiest way to achieve this is to limit the amount of waste dumped into landfills. This means establishing municipal infrastructure to enable recycling through separation at source. Furthermore, it means establishing enterprises to collect and then beneficiate reuse waste. Here the challenge is the ownership of waste which belongs to the municipality. In terms of Supply Chain Management procedures, the municipality cannot easily dispose of these materials for recycling and beneficiation in an efficient manner without revised procurement and access provisions. Enterprises, employment and reduced dumping at landfills are all stalled initiatives, due to a lack of innovation with the regulations. Instead of composting garden waste and grass cuttings from public parks, a lot of this valuable material goes to a landfill, because it is easier to dump it there. Similarly, procurement processes and the difficulties of pursuing unsolicited bids, dampens the development of enterprises involved in the beneficiation of plastic into poles and planks for use in construction or in playgrounds as all-weather substitutes for wood. The same problem applies to building rubble, which is easily processed into high quality building materials. These opportunities for recycling, beneficiation and SMME and employment creation are best illustrated by Use-It,³⁰ a Section 21 company operating in the eThekweni municipal area. It operates using the Marianhill Landfill and has a track-record in demonstrating the financial viability and environmental benefits of using waste as a resource for further development.

Another set of examples illustrate these challenges in the area of energy efficiency and roof-top Solar PV roll-out at municipal level. It is estimated that households use about 60 per cent of their electricity to heat water. If large numbers of households install solar water heating (SWH) equipment, electricity consumption will drop and Eskom will emit less GHG. Assuming that a large SWH system for a medium size household costs R30 000, the monthly saving on electricity would easily pay the capital cost over a three- to five-year period. Up until early 2015, Eskom provided subsidies to incentivise homeowners to install SWH. Thereafter, the DoE took over the whole SWH programme and dropped the subsidies. As an alternative, it intended to bring in the private sector, manufacturers, banks and insurance companies to drive the installation of SWH in South Africa. So, how do banks, municipalities, installers, householders and Eskom/DoE coordinate to make this obvious beneficial intervention possible?

Municipalities need to enable their billing systems by adding new line items like repayments to banks. This would align monthly savings of electricity from SWH with bank payments, showing how the SWH is actually paying for itself. In this way, householders would see that they are paying off capital every month with the saving on decreased electricity consumption. Banks also need some cooperation from municipalities, so that capital repayments paid to municipalities are ring-fenced and transferred to them. All of this cooperation is complicated, but not impossible to achieve. In order to ensure bank and insurance company buy-in, the SWH systems need to be certified for qualification and procurement. This means that the South African Bureau of Standards (SABS) and its testing facilities must also become part of the equation. All of this has resulted in South Africa, with high levels of solar radiation, not achieving the roll-out of SWH to middle-class and upper-middle-class households, which are the heaviest consumers of electricity for heating water. SWH on RDP houses have been a huge success in terms of health benefits, but have not contributed to a reduction in energy consumption. As the solution to this puzzle has not been found yet, the establishment of installers, employment creation and the upscaling of local component manufacturing has stalled.

In Germany, it is commonplace for homeowners to have Solar PV electricity generation panels on their roofs. This technology is well advanced and prices have come down significantly over the last five years. In South Africa, which has high levels of solar radiation, the roll out of these systems at local level has stalled. The first challenge relates to the National Energy Regulator of South Africa (NERSA) recently stating that households installing such technologies cannot be paid in cash for the power they send to the municipal grid. Instead, the meter is to be reversed until it reaches zero Rand payable by the householder. The meter will stop at zero and no negative balances can be accrued. While there is a saving for households, which will help with the capital repayments for the installation of roof-top Solar PV systems, the fact that NERSA intends to limit this to the amount for electricity consumed per month, means that there is no real incentive to households to install such systems. In Germany, homeowners are paid a set tariff for the electricity that enters the grid irrespective of the amount of grid electricity consumed.

Municipalities could easily buy the power generated by households at the same rate paid to Eskom and thereby incentivise homeowners to invest in such systems, with obvious benefits. In addition to the regulatory issues, municipalities depend significantly on onselling electricity to consumers as a source of their finance. Reduced electricity consumption through energy efficiency and localised energy generation threaten their revenue base. Until all of these challenges are addressed through clear policy guidelines, the renewable energy sector will remain undeveloped at local level, even though it has vast employment creation and local manufacturing potential.

The few examples discussed above demonstrate that the green economy has enormous potential at municipal level. Other examples include replacing tungsten vacuum street lights with much more efficient Light Emitting Diode (LED) fittings. However, realising the potential of the green economy requires innovation and regulatory review adding another dimension to national, provincial and municipal coordination.³¹ In the case of converting public transport to run on methane, economy of scale is required to produce the feedstock resource, as well as to reduce the price of the components and the price of installation. The same issues confront SWHs and roof-top Solar PV panels. Similarly, there is a need to build up a feedstock supply chain of recyclable materials for beneficiation. Provinces might play the role of coordinator-in-chief here, by bringing competing municipalities together to achieve clear-cut environmentally and economically sound outcomes.

CONCLUSION

The policy and regulatory frameworks linked to the intergovernmental relations system in South Africa is both highly complex and fragmented. To achieve the outcomes of the green economy, as set out in national policy documents, there is a need to innovate, revise and rewrite legislation and regulations, so that they become enablers for, rather than obstacles to, green development.³² Transitioning to a green economy is not a simple matter of investment in new technologies: it means realigning just about every facet of public sector operating procedure. It also entails knowledge dissemination and culture change to enable innovation and collective problem solving.³³ Only then will the investment flow, with the concomitant creation of sustainable employment. The kind of coordination required in order for this to happen cannot be based on current thinking. Horizontal and vertical coordination challenges cannot be addressed by performance plans, monitoring and evaluation systems aligned to key performance areas that are linked to key performance indicators – all of which are based on a cascading strategic plan.³⁴ The implementation challenges will simply continue, thereby hindering the execution of policy. The green economy, more than many public sector initiatives, requires organic learning policy networks to identify the challenges and cooperatively develop interdepartmental and intergovernmental solutions.³⁵ This approach to public sector organisational development

goes beyond the NDP's conception of a capable state. A capable state will help, but it is the degree of innovation, initiative and networking that will allow interdepartmental teams the space to explore and develop enabling and regulatory compliant solutions.³⁶ It is only in this way that the potential of the green economy can be unlocked.

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A Psycho-Social Economic Analysis of Green Jobs in South Africa

Addressing Recent Socio-Economic Developments

Claudia Gossow, Adriaan Buys and Kevin Mearns

ABSTRACT

Faced with critically high levels of poverty and unemployment, the South African national government is strongly committed to emphasising the potential of a green economy, in order to support new employment opportunities. This commitment is currently classified as one of the ten jobs drivers in South Africa and is highlighted in the New Growth Path (NGP) strategy document and supported by the Industrial Policy Action Plan (IPAP). These plans encompass strategic initiatives to develop green industries and improve energy efficiency, including local plant and crop growth projects and recycling opportunities. This chapter encompasses a review of the current local green job opportunities in South Africa. It draws from initiatives that have been implemented overseas and locally. Emphasis is placed on the way in which emerging green jobs have and could alleviate the high levels of unemployment and poverty in the country, and address challenges and provide possible solutions. Through a literature review process, the paper seeks to answer the major question: How have emerging green jobs alleviated unemployment and positively influenced the health and well-being of local individuals and communities in South Africa, particularly those that work in and who are affected by the green growth economy?

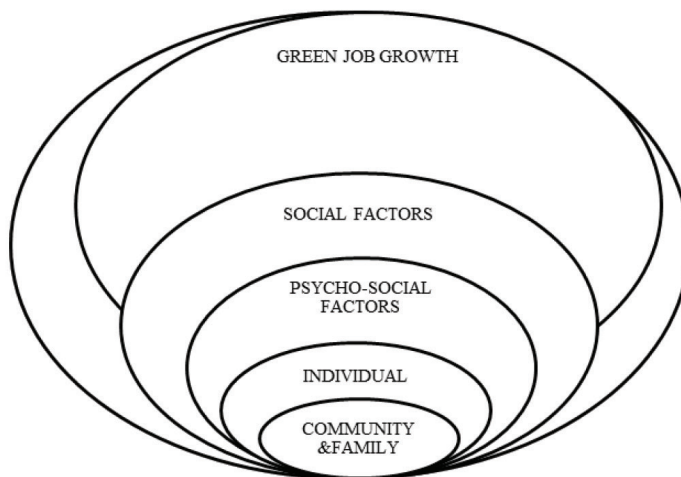
INTRODUCTION: AN ECONOMIC FRAMEWORK THAT CARES

We owe it to all the peoples of the sub-continent to ensure that they see in us, not merely good leaders waxing lyrical about development, but as the front commanders in the blast furnaces of labour, productive investment and visible change.

Nelson Mandela ¹

With South Africa facing many social and economic challenges, attention should be on alleviating these concerns. Unemployment is estimated at 25.5 per cent² and HIV/AIDS is reportedly affecting approximately 5.51 million people (2014 figures).³ High levels of crime also need to be addressed. The New Growth Path strategy, now replaced with the newer National Development Plan (NDP) introduced in 2011, aims to create 300 000 new green jobs by the year 2020.⁴ As it is unclear how the outcomes of a greening economy and green jobs could affect human well-being, or how the quality of life of workers and the unemployed could influence the emerging green economy, research is required to explore and define these outcomes further in light of the green economy transition. Green jobs are essential to promote sustainable development and respond to the global challenges of environmental protection, economic development and social inclusion. Governments, workers and employers could engage as active agents of change in implementing green economy policies and practices to create (decent) employment opportunities, enhance resource efficiency and ultimately build sustainable low-carbon societies.⁵

The link between the elements covered in the newly constructed psycho-social economic framework (Figure 3.1) introduced herein could aid in this regard, although further validation of suggested linkages to these elements is essential. Although not yet validated and tested, it could serve as a practical tool that decision makers and policy role-players (including government officials) could use when taking the human, local and international contextual factors into account during economic and green growth decision-making. The framework's theoretical stance has a psychological undertone, although the identification of a suitable theoretical framework is needed to accompany and support this framework and the linkages/influences suggested. The construction of this theoretical framework was complemented by influences from the field of environmental psychology, as well as local social/community studies and official government and statistics reports.^{6,7,8,9,10}

Figure 3.1: Psycho-social economic frameworkSource: Authors¹¹

The aim of this chapter is to present a clearly illustrated practical psycho-social economic framework, to demonstrate how the recently implemented green job initiatives could be affected by and, in turn, influence the overall well-being of South Africans. The framework (Figure 3.1) seeks to provide insight into the major job drivers envisaged to reduce unemployment in South Africa, through the green economy transition process that covers all aspects of economic, psychological and social activities.

The chapter was drawn up using secondary research as a method and the layout is as follows: An illustration using existing literature, mainly the NGP strategy document and a review by Natrass. A newly designed psycho-social economic framework was included. This is to demonstrate the focus that has been placed on the development of emerging green jobs in South Africa and how these affect and are, in turn, influenced by socio-economic and individual characteristics. The aims of the NGP strategy and its summary of what constitute possible job drivers in South Africa are briefly discussed, as these are largely unknown by those involved in and who study green economy and associated developments.

The social constructionist paradigm and a description of the framework mentioned, constitute the broader outline of this chapter. The social constructionist paradigm emphasises that the context we live in influences who we are and who we are shaped to be. In other words, what we are, is a result of who we have been and what we want to become.¹² The focus is therefore on those affected directly and indirectly by the emergence of green jobs, who, in turn, play a role in emerging green job developments, either directly or indirectly. Political, cultural, historical and family background, as well as economic influencers are considered. These are all essential factors to consider when

taking important economic decisions and attention should also be given to the social ills caused by environmental degradation and a decline in economic activities, including a decline in food production due to poor soil quality and drought, poverty, HIV/AIDS and others factors.

To understand these factors using the theory of environmental disconnectedness, and the reasonable person model, influencers as covered in the psycho-social economic framework could have an immense impact on the emerging green economy and current and future decisions. Social and economic factors should be considered along with psychological characteristics that shape us. Psycho-social factors, including workplace and financial stress, and the quality of family and community relationships, should also be considered. (Psychological elements, such as the level of personal mental health and the motivational levels of individuals, in the workplace, in the community or at home, refer to factors associated with and affected by psycho-social factors.)

The future well-being and quality of life in South Africa depend on current decisions being made in the country. As articulated in the NDP, one of its aims is to eliminate poverty and reduce inequality by 2030, with the government and the private sector engaging, so as to understand how they can all contribute towards effective implementation of appropriate policies and plans and the identification of any obstacles that could prevent them from fulfilling their roles effectively.¹¹ To this end, additional knowledge of how factors such as those in the framework covered, indirectly influence economic development and the success of green job implementations with aid from existing psychological and economic theories and methodologies (for example, PESTLE Analysis – an analysis tool used to cover the political, economic, social, technological, legal and environmental circumstances or standing of individuals, communities or organisations to be investigated)¹² could assist economic decision and policymakers to formulate appropriate policies and strategies crucial in shaping the country's future.

UNFOLDING THE IRON CURTAIN: A HOLISTIC SOUTH AFRICAN ECONOMIC FRAMEWORK

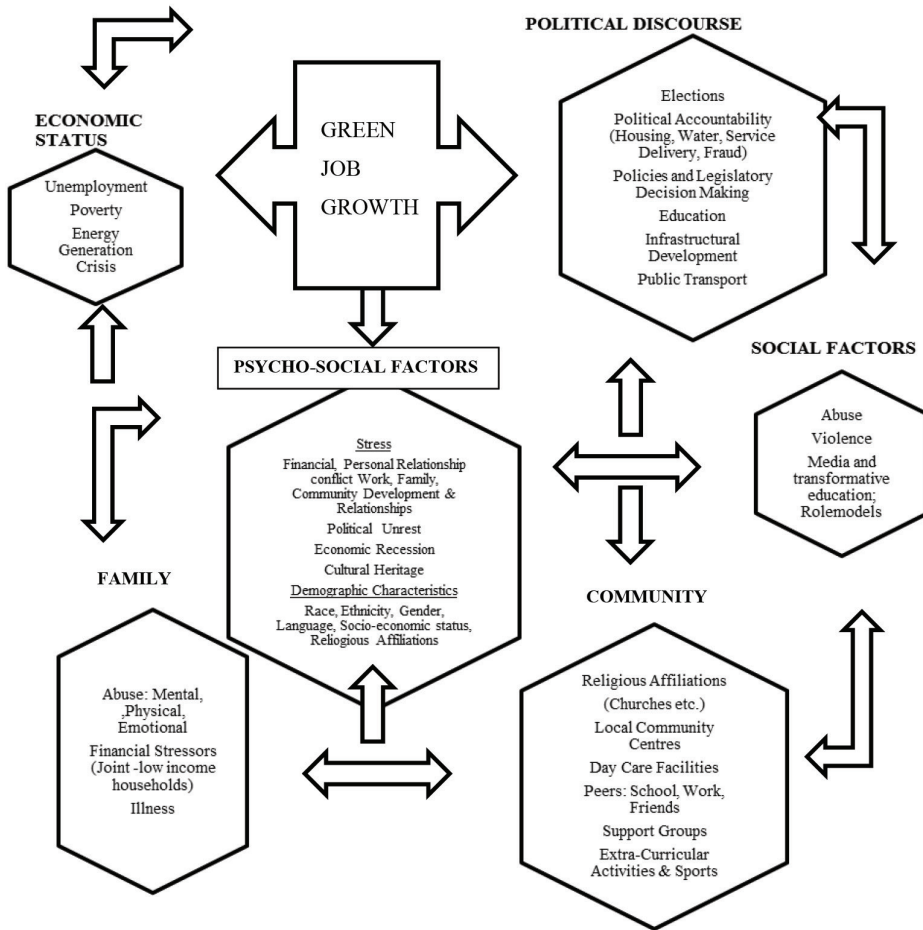
Poverty, high unemployment and high crime levels remain a concern in South Africa, despite improvement in other aspects of life for many individuals since 1994. The adverse impacts of these issues are exacerbated by the disconcerting prevalence of HIV/AIDS that affects at least 5.51 million people (2014 figures).¹³ The South African government, important role players and a variety of local, regional and international stakeholders are working to change the state of the economy of the country. Creating green job opportunities is a significant part of this effort. To realise positive outcomes henceforth, it is important that certain human factors are considered to aid the job creation process. The illustrative framework (Figure 3.2) demonstrates the relationship between the economic and political situation in a country, including green job growth, and social, individual and associated factors that influence each other. Decision makers could consider this framework when

monitoring the development and effectiveness of implementation of policies and strategies aimed at creating green jobs.

This framework demonstrates the importance of economic and policy decision makers in addressing unemployment, poverty and other social concerns. Ordinary South Africans, in general, prioritise feeding their families and living a good quality life, although bigger economic issues, like the national or global recession, as well as the crime rate and job security, are also considered by many citizens.¹⁴ The framework illustrates how the psycho-social framework operates. *Economic* factors include poverty, high unemployment and crime. Policies to supply housing, water and energy are also included, as they influence things like education, violence and abuse, as well as the quality of community life and family relationships. In turn *social*, *psycho-social* and *individual* factors, such as *community* and *family*, are linked and affect the *economic* and *political* sectors and quality of service delivery.

Within the psycho-social domain, policy role players and economic decision makers should take note of issues such as stress associated with the workplace and income as these affect one another.¹⁵ As suggested by a United Kingdom (UK) study, workers tend to perceive the economic situation as directly impacting their working conditions in a psycho-social context and essentially their mental health.¹⁶ This could include the stress associated with pressure placed on workers in the workplace as a result of a poor economic state, whereby workers are expected to perform above their capabilities in order to boost productivity and output. Conflicting relationships and characteristics, such as cultural heritage and demographic characteristics, are also important.

Figure 3.2: Expanded layout of the psycho-social economic framework



Source: Authors¹⁹

This holistic demonstration of relationships as presented by the two-way arrows emphasises the mutually beneficial relationship of increased quality of life that local people could experience through the creation of green jobs. The nature of green jobs and their drivers is discussed briefly in the next section.

THE GROWTH OF GREEN JOB OPPORTUNITIES IN SOUTH AFRICA: A BRIEF ILLUSTRATION

Insufficient value has been placed on the influence current socio-economic developments could have on the psychological or psycho-social effects on workers, in addition to the personal benefits that a green economy or related developments could have on individuals/workers. This could include characteristics such as stress in the workplace, or resulting from an economic recession or natural disaster, which in turn could influence worker productivity and job security among others.²⁰ This is to say that our professional performance, as well as social and personal development is dependent on the state of our economy. The outcome of a green economy and the associated development of green jobs could, in part (and in principle), be responsible for the positive or negative outcome of our personal, psychological developments and hence our overall well-being.²¹

What is known about the growth of green job opportunities in South Africa? There is limited research in this space. The country's green economy transition approach is mentioned briefly in the NGP strategy, the Green Economic Accord and the NDP. The NGP aims to support economic growth in a low-carbon economic development trajectory, as articulated in the South African Green Economy Modelling Report (SAGEM).²² To this end, the NDP further emphasises the importance of informed planning and implementation based on evidence-based monitoring and evaluation.²³ Focus thus far has been on the promotion of, and benefits of introducing an inclusive and systemic green economy transition process. This entails developing a comprehensive plan with aid of the framework discussed, which could provide a detailed understanding of how workers and the green economic sector alike are able to influence the objectives of sustainable development and poverty eradication in South Africa by means of a collaboration. In this space, the energy generation crisis is of particular concern. It is crucial to place focus on the success of some of the recently implemented green initiatives.

In his State of the Nation address, delivered in February 2015, President Zuma highlighted the progress made and the achievements of some of South Africa's environmental programmes. Among them were the 'working for' programmes, namely Working for Waste, Working for Wetlands, Working for Water and Working for Fire. These programmes contributed towards creating more than 30 000 work opportunities by 2015, in addition to the increasing number of small business opportunities in the recycling sector in 2016,²⁴ and the improvement in appropriate and desired waste management practices.²⁵ In addition, the programmes sought to create more than 60 000 job opportunities during the 2016/2017 financial year. A special focus in President Zuma's speech was on increasing the number of green jobs in the country.²⁶ This implies an emphasis on the development of new and environmentally sustainable and energy efficient technologies and strategies. Wind and solar power are among the few options that could address the local energy crisis. More important, these sources of electricity could lower the country's carbon emission count and various other environmentally damaging activities that influence activities associated with poverty, violence, abuse and illness, including HIV/AIDS and

other mental health problems that are associated with poor environmental conditions. For instance, poor air quality and litter cause health concerns that, in turn, result in a decline in well-being and living conditions that lead to crime and other social ills. The effects of environmental problems such as air pollution, the depletion of the ozone layer and reduced natural resources for human consumption, along with the social challenges these problems present, should be noted. The effects of environmental depletion, as well as the social challenges such as those mentioned here can be linked and their relationship studied further using the holistic psycho-social economic framework.

It is important to understand how green jobs could aid in improving the quality of life for local communities, including that of the labour force. The growth of green job opportunities could be influenced directly by the state of the natural environment. For example, to increase agricultural and other sustainable job initiatives, improving environmental conditions could allow for better soil, air and water quality, which is necessary to support and expand local green jobs in the local food production industry value chain. In turn individuals could reconnect with their surrounding natural environment, which is closely related to the economic, political, social, community and family environments. This could grow awareness of the ways in which enhanced natural surroundings could improve quality of life and create greater personal satisfaction and therefore improved work productivity, resulting in a wealthier population. The psycho-social economic framework could possibly support this link, although for further refinement of the model the associated linkages should be investigated and tested.

The theory of environmental disconnectedness highlights that an increased connectedness between local communities and their natural environment, currently under threat, should be investigated.²⁷ As Fry²⁸ and Orr²⁹ have suggested, being disconnected from the environment initially results in human beings showing a willingness to destabilise the climate. This results in conditions that support war and undermine our ability to meet our collective needs for water, food, land, safety and security. Orr has also suggested that climate change could ultimately be viewed as one of the biggest social issues of our time,³⁰ as it results in environmental degradation and associated social ills that follow. Schmitz and colleagues state that the severity of this separation or environmental disconnectedness and its development has taken place in more recent years and has resulted in further destruction not seen since the entry of humans into the modern machine age and hence the rise of technological ingenuity.³¹ To shed more light on this matter, the social constructionist paradigm has been incorporated in this chapter. This model highlights our actions and our decision to either become more involved in green job initiatives or not. The psycho-social economic framework suggests a variety of, but not all, elements to be considered when determining which decisions are most effective in order to spark green economic development, and further highlights that the environment is influenced by human activities. In turn, this theory is in line with the psycho-social economic framework and could guide decision makers and other important role players who focus on generating positive economic developments.

The social constructionist paradigm serves as the underlying principle that informs the psychological framework used in this chapter. It posits that knowledge, including human actions and perceptions, among other elements, are created by means of social interchange. The way in which we understand the world depends on active cooperation of individuals in a relationship. In other words, we understand the world using social artefacts that include historically situated interchanges among people.³² In this context, and in line with the social constructionist paradigm, one could then conclude that people who reside in South Africa act and perceive the world around them based on where they come from. This includes employment, finances and living conditions. Also important are one's cultural and religious upbringing, as well as previous educational and community programme experiences.

The Reasonable Person Model (RPM), which serves to support the psychological elements discussed in this study, argues that, intuitively or intentionally, people resist making changes that they perceive will reduce their quality of life, despite still showing concern about the future, including that of the environment. This implies that the circumstances that people find themselves in determine their behaviour.³³ The psycho-social economic framework aims to support this notion. This gives reason to consider external country specific extrinsic factors such as political stability and the quality of health care and education listed in Figure 3.2, as well as our intrinsic factors and motivations and traits that determine the extent to which we act and view the world around us, which as already mentioned, could guide decision makers and other important role players who focus on generating positive economic developments focus on the influence of such extrinsic and intrinsic factors whilst developing the economy further. The *social constructionist paradigm* supports this view, which emphasises that the process of understanding is not driven naturally, but is rather the result of people actively interacting and cooperating with one another. This suggests that inquiry is to be viewed to form part of the cultural and historical aspects of different perceptions that have been constructed about the world.³⁴ It is important to consider the human and social factors, in order to make green growth decisions. It is shown, for example,³⁵ that a link exists between an individual's spirituality or religious outlook and one's experience of nature. The positive effects that spirituality can have on us³⁶ and on the domains clearly outlined in the psycho-social economic framework illustrate this influence.

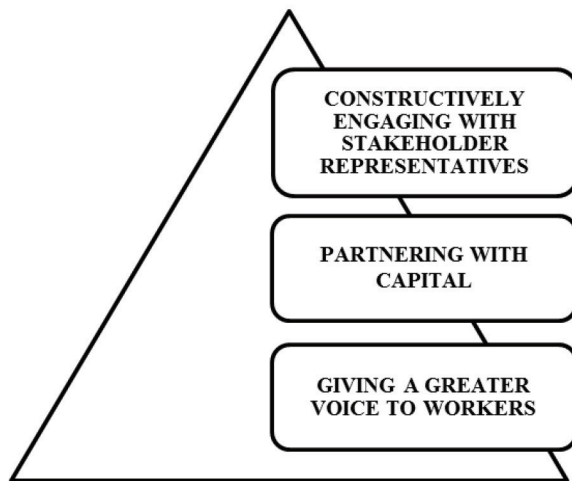
Following this outline of the theoretical considerations informing this chapter, the next section outlines the 'green' content of the NGP.

NEW GROWTH PATH STRATEGY (NGP): AIMS AND OBSTACLES

The NGP strategy, supported by the Green Economy Accord – a social pact between government, labour unions, the private sector and civil society – aims to create 300 000 new green jobs in South Africa by 2020.³⁷ It emphasises the use of social democratic discourse

to constructively engage with stakeholder representatives. This could give a greater voice to workers to be affected by the evolving green job initiatives introduced in the country to make valuable suggestions and play a role in economic policies and decision making. Overall, the NGP seeks to establish a 'developmental state', in order to support new productive activities. Areas for development and growth include manufacturing, mining and agricultural supply chains. The aim is to target a range of knowledge-intensive and skill-intensive activities in these sectors, such as biotechnology and green technologies, including solar power. However, the NGP has not yet developed a solid economic plan outlining how future job creation is to be achieved or managed,⁵⁸ which is where workers come in to provide their input based on experience, background and historically constructed views. Such a plan has to consider all factors that impact the process of creating green jobs. In the context of this chapter, this could assist in understanding how socio-economic and positive psychological developments could be addressed and incorporated into these plans. Figure 3.3 presents the major points to be considered, when role-players go about monitoring the presence of local green job initiatives. Also crucial is that obstacles that are not evident at first should be considered, as these could make the process of future job growth creation more difficult than anticipated at first.

Figure 3.3: Social Democratic Discourse Framework

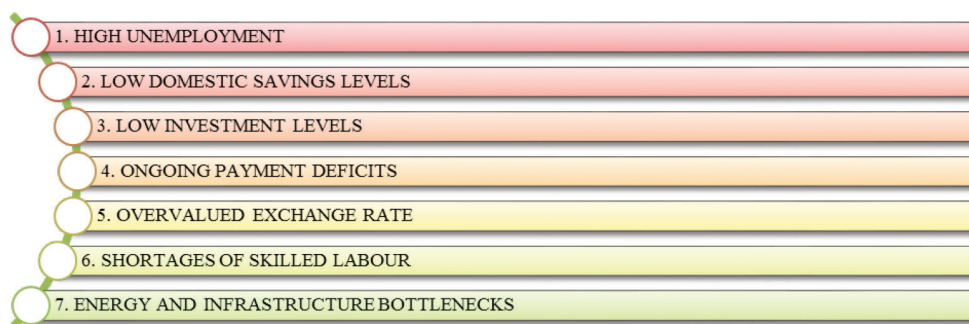


Source: Natrass⁵⁹

In order to implement the initiatives that can run South Africa's 'developmental state' using suggestions associated with social democratic discourse, as indicated in Figure 3.3, it is pertinent that the psycho-social economic framework be considered as a guiding framework in this regard. Stakeholders could use the framework as an aid when considering certain important points. Three suggestions have been included for consideration to

further aid stakeholders in this regard. Resisting rigid reductions formulated in industrial and agricultural tariffs and an increased focus on using resources derived from progressive local taxation are two important points. In addition, domestic savings should be boosted and mobilised through, for example, the purchase of development bonds acquired by pension funds.⁴⁰ The psycho-social economic framework could assist stakeholders in this regard, as its aim is to serve as a tool to aid economic role-players in identifying possible elements that could potentially have an influence on the decisions aimed at improving the state of the economy. It could possibly aid in identifying the steps necessary to succeed and to overcome obstacles as presented in Figure 3.4, that might arise, as a result of a clearer understanding of the link between the elements included in the framework. These obstacles have been discussed by various scholars and organisations, including Spence,⁴¹ Hausmann⁴² and the Organisation for Economic Co-operation and Development (OECD).⁴³

Figure 3.4: High level list of internal and external country-specific obstacles



Source: Authors⁴⁴

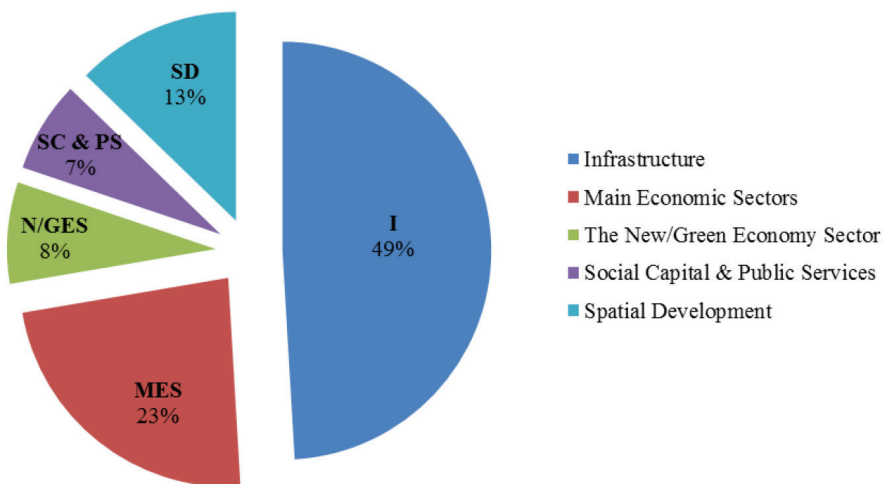
In terms of the rigidity of the labour market, specifically regarding the employment of unskilled low-wage workers, a 'decent work' agenda in South Africa's trade union movement is accepted as is.⁴⁵

The aims and obstacles laid out in the NGP strategy and briefly listed in this section, give an understanding of what could affect proposed job growth, along with the characteristics illustrated in the psycho-social economic framework. In turn, these factors could also be influenced by social, psycho-social, community and familial factors, as laid out in the psycho-social economic framework.

MAJOR SOUTH AFRICAN JOB DRIVERS: RISING EMPLOYMENT FIGURES

The NGP strategy provides a summary of some job drivers in South Africa that have been identified recently. These, including the green economic sector, are expected to generate at least 5.1 million new jobs by the year 2020. Figure 3.5 indicates the major South African job drivers and the percentage each driver is expected to contribute towards improving employment in South Africa by 2020.

Figure 3.5: Percentage of contribution of major South African job drivers, including in the green economic sector (Total: 5 095 000)



Source: Authors⁴⁶

Jobs in infrastructure include those that are either directly or indirectly related to the following:

- Public investment in energy, with 33 per cent from renewable resources and 25 per cent from nuclear power;
- Transport, with special emphasis on rail transport;
- Water;
- Communications; and
- Housing

The main economic sectors (including agriculture) expect to generate at least 1.2 million new jobs by 2020. The social capital and public services sectors focus on opportunities in various domains, including the non-government organisations (NGO) sector and expect

to create at least 260 000 new jobs. Additionally, the public sector could generate at least 100 000 new jobs in sectors other than the green economy, for example, in areas such as the health, education and policing sectors.⁴⁷

Spatial development as a job driver will create approximately 650 000 new jobs in areas including public investment in housing and infrastructure, which will result in improved living conditions and further opportunities for residents to foster sustainable ways of living through their own activities. In this way, potential sustainability in local communities could be fostered and development boosted, as improved spatial and living conditions aid in creating healthier and more positive attitudes of local residents, particularly in rural communities. Ultimately, the livelihood of at least 500 000 South African households could improve.⁴⁸ Additional employment can be stimulated in domains that include small-scale agriculture, service-cooperatives and community food gardens. Regional development and infrastructure jobs are projected to generate 150 000 additional jobs; this includes small-ports networks, the integrated road and rail networks sector, integrated supply chains and industrial domains. Also worth considering, is South Africa's role as a logistics and service hub, although this is not directly linked to the green jobs focus.⁴⁹

In light of the green job growth in the context of a green economy transition, the roll-out of solar⁵⁰ and wind energy resources is important in South Africa. The government had planned to install one million solar water heaters by 2014,⁵¹ but by December 2015, less than half of the targeted water heaters were installed and the targeted number of jobs had not been created. Agriculture also offers space for creating the desired jobs, despite local challenges related to poor soil quality and limited availability of water. There are opportunities for the production and export of organic agriculture, together with the opportunity to increase skills and jobs in this sector. Trade in organic agriculture could potentially play a significant role in addressing food insecurity, land degradation and climate change, and also aid in reducing poverty, which, in turn, benefits the economy, society and the environment.⁵²

The energy sector is also important for creating green jobs, with alternatives such as the biofuels and biogas industries becoming increasingly popular.⁵³ Of the envisaged new energy generation capacity, 33 per cent is estimated to stem from renewable sources.⁵⁴ These could serve as important supplements to alleviate energy generation crises at times faced by the country. Ecotourism, including the preservation of natural heritage sites and parks, as well as the recycling industry, which entails the cleaning of open spaces (clearing of illegal dumping sites, street cleaning and sweeping, litter pickups), as well as waste collection (sorting of recyclables and more green buildings), could aid in expanding local employment opportunities, particularly in the informal sector where the focus is to generate more low skilled jobs. Although jobs in the ecotourism industry are not yet clearly outlined, jobs in the recycling industry and in the construction industry are growing constantly and could contribute to reducing poverty and unemployment (as highlighted in the psycho-social economic framework), by creating more job opportunities, including

initiating small business opportunities in the recycling and associated green job development space. The psycho-social economic framework suggests that initiatives such as these aid in alleviating poverty and other social ills in South Africa, for example, HIV/Aids. The formal waste sector in South Africa employed roughly 29 833 persons in 2012, whilst the informal waste sector constitutes an estimated income two to three times higher than that of the formal sector. Overall, the waste sector employed around 113 505 people in 2009, of which 74 per cent were said to be in the informal waste sector. In light of the framework, these developments could reduce South Africa's social concerns significantly, based just on preventing further environmental degradation and by growing the local labour market, and hence growing job opportunities that could alleviate South Africa's high unemployment rate and other associated social ills.

To conclude, the aims of a greening economy highlight the expansion over various economic sectors both in manufacturing and service delivery. Increased support for investment opportunities, the encouragement of local production and increased employment and facilitation of re-skilling are also emphasised.⁵⁵ Clearly, a green economy, underpinned by the principle of integrating social, economic and environmental factors, could result in improved human well-being, as well as social equity, and hence reduce the risk of environment degradation.⁵⁶

THE WAY FORWARD

A GUIDING FRAMEWORK FOR ECONOMIC DECISION MAKING

The aim of this chapter is to provide readers with a clear illustration of current local green job developments and the socio-economic factors evident in South Africa, in relation to how these affect and are linked to one another. Emphasis is placed on how green job growth could be affected, either directly or indirectly, by quality of life and other relevant individual characteristics, with special emphasis on further evaluation of and testing of these suggested linkages.

The illustrations and suggestions made emphasise the use of a psycho-social economic framework. This framework is introduced in the context of the social constructionist paradigm. Two psychological theories were incorporated into this psycho-social economic framework to explain how, why and which actions individuals take based on the environment in which they live. A link between economic growth, particularly green job growth, and major job drivers and associated green jobs was illustrated. An increase in green jobs and the effects associated with the quality of South Africans' lives and how this in turn influences the outcomes of a positive economic development were highlighted. This was done by using the psycho-social economic framework. Essentially, what this study showed is that despite the green job estimates, no comprehensive studies have yet been undertaken to quantify the direct, indirect and induced jobs that could be created by the green economy transition in South Africa.⁵⁷ Studies in this field should be undertaken

urgently. It is evident, however, as demonstrated in the psycho-social economic framework, that increased employment opportunities, particularly green jobs, not only contribute towards alleviating social and psychological ills such as stress, but, in addition, add to the increased reduction of waste that is associated with climate change concerns. This is in addition to the improvement in local infrastructure and an improved environment overall. This could potentially aid in improving locals' wellbeing, particularly those associated with the green economy sector. As argued earlier, a healthier labour force could develop and improve the state of the local economy and other important domains, such as social, community, family and individual development.⁵⁸

In order to understand green economic growth and job developments and its effects on the country's employment figures, one needs to consider the context wherein these developments occur.⁵⁹ The psycho-social economic framework could outline important factors, such as the crime rate, culture, community or family determinants, that need to be considered when decisions on future economic and green growth developments are made and investigated further. To date, limited evidence exists regarding how the various elements in the framework affect one another and are linked. It is highly recommended that this be investigated. The framework should be further tested for reliability, validity and relevance within the South African context, using primary research.

In addition, studies could be conducted to ascertain if this framework does in fact aid decision makers and policy makers in monitoring and making the necessary green growth transition decisions. Further research, using either quantitative or qualitative means, could be conducted to determine whether or not there is a link between the growth of green job opportunities and the quality of life in South Africa and beyond. As noted by UNEP, 'South Africa aspires to be a sustainable, economically prosperous and self-reliant nation-state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration'.⁶⁰

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Green Economy Readiness in South Africa

A Review of Skills and the Immigration Regime

Nedson Pophiwa and Nompe Ntombela

ABSTRACT

The paper contributes to emerging scholarship on South Africa's readiness for a green economy and growth transition, by building a case for the inclusion of skills importation during this transitional phase. The Green Economy Accord of 2010 nominated the Department of Higher Education (DHET) to be the strategic partner responsible for the provision of skills that will drive the green economy and growth transition. However, it will take some time for the DHET to achieve that responsibility, considering that it takes time to educate and train professionals. Another inconvenient truth that worsens the situation is the fact that South Africa faces severe skills shortages in a number of specialised sectors, even before one considers the growing need for specialised personnel who can operate in a green economy. The paper argues that the short term remedy for this predicament will be to look at importing green skills from other countries, as a parallel process to educating and training of South Africans. The onus will be on the Department of Home Affairs (DHA) to facilitate the legal migration of such personnel. However, the DHA's capacity to ensure the smooth registration of skilled immigrants who want to work in the country has always been troublesome. In May 2014, DHA published a new list of scarce skills, after consulting industry and other government departments. Whilst green skills are not a specific category, the focus of this paper is on assessing the readiness of South Africa's immigration regime to accommodate immigrants with green skills and to recommend how this can be achieved.

INTRODUCTION

South African policy makers have embraced a green economy/green growth as a viable option for the country's economic growth and developmental needs for years to come.¹

They realise the risk to sustainability associated with heavy reliance on a carbon intensive growth path in strategic areas such as energy generation and industrial production. It has become clearer that a green economy and green growth provide opportunities for achieving local policy imperatives, such as job creation through green jobs and the simultaneous reduction of greenhouse gas emissions (GHGs). It has been evident in the release of a number of policies and public pronouncements over the past few years that South Africa does indeed recognise the opportunities that will accrue from green industries, as noted in the National Development Plan (NDP).² One of the visible commitments is the Green Economy Accord, which was signed by government entities, business and social partners, with the aim of creating jobs while addressing climate change and promoting green economy. The Accord aims to create five million jobs by 2020³ and it has nominated the DHET as the strategic partner responsible for ensuring the skills that will drive the green economy. Other noticeable policies aimed at unleashing the potential of the green economy are the Industrial Policy Action Plan (IPAP) II of 2011⁴ and the National Climate Change Response Strategy (NCCRS) of 2011.⁵ Each of these policies has trickled down to municipal levels, as witnessed in, for example, a number of solar water-heating projects installed in low income households across the country and the mobility of passengers being enhanced through the launch of bus rapid transit projects in the metropolitan areas.

A report by the Organisation for Economic Co-operation and Development (OECD) and the European Centre for the Development of Vocational Training (Cedefop), cautions that when countries choose to implement a green economy and green growth they must realise that adequate and effective policies are needed to ensure the necessary skills are available to support this transition.⁶ In a situation in which the necessary skills for a transition to a green economy are in short supply, the onus is on government to ensure that it prioritises the reskilling of human capital. South Africa's situation is worsened by the dual problem of critical skills shortages and high unemployment. With an unemployment rate of 25 per cent (measured in the third quarter of 2014)⁷ and skills shortages, it is important to develop a 'green mind-set', following the recognition that green skills are needed. The short-term remedy to this predicament will be for the country to look at importing green skills from other countries, as a parallel process to educating and training South Africans. The onus will be on DHA to carry out that responsibility. However, the DHA's capacity to ensure the smooth registration of skilled immigrants who want to work in the country has always been a problem. Whilst green skills are not a specific category, the focus of this paper is assessing the readiness of South Africa's immigration regime to accommodate immigrants with green skills and to recommend how this can be achieved. Considering that the transition to green jobs will require reskilling and retraining of local labour, it will be vital to recruit skilled immigrants working in green jobs or sectors in countries where the green economy transition is now at an advanced stage, as this will assist in such skills transfer projects. The level of readiness is thus assessed in this chapter by means of a review and analysis of emerging scholarship, state-led initiatives and

numerous policy documents relating to the immigration of skills for the green economy in the South African context.

The next two sections provide a definition of green jobs and a discussion on the extent of the skills shortage in South Africa. This is followed by a section that discusses the mammoth task of job creation in South Africa and the role that the green economy ought to play. A motivation for skills immigration in South Africa is then provided, followed by a discussion of the legal and policy landscape of immigration in South Africa.

WHAT ARE GREEN JOBS?

The green economy is an important concept that emanates from rigorous debate regarding sustainable development, and which has elicited different definitions from various authors and institutions. The United Nations Green Economy Initiative defines the green economy as ‘the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities’.⁸ The green economy is expected to deliver three types of outcomes, namely:

- i. new sources of income and jobs;
- ii. low carbon emissions, reduced use of resources, and reduced generation of waste and pollution; and
- iii. contributions to the broader societal goals of sustainable development, social equity and poverty reduction.

Both developed and developing countries are expected to make a shift in various areas that are considered relevant to their context. Suggested priorities for green investment for developed countries are: energy-efficient buildings, sustainable transport and renewable energy. For developing countries, the list includes: sustainable agriculture, freshwater management, and sanitation.⁹ To sustain the green economy, the development of green jobs and green skills must be sustainable.

The notion of green jobs is one that is quite contested among scholars in terms of definitions, perhaps due to its infancy. There is, nevertheless, a common thread in these definitions, i.e. that green jobs constitute jobs that play a role in fighting climate change. Thompson and Duffy support the notion that the term green jobs means ‘good jobs created or protected by policy measures that reduce GHG emissions and provide other environmental improvements’.¹⁰ In this definition, the underlying aspect is that these jobs are *protected or created by policy measures*, as opposed to jobs that are not created through state planning or policy making. Another definition specifies the sector spread of green jobs by indicating that green jobs constitute work in agriculture, manufacturing, research and

development (R&D), administration and service activities that contribute substantially to preserving or restoring environmental quality.¹¹ An interesting observation is made by Chen¹² that most definitions of green jobs tend to focus only on the environmental aspect, when green jobs should not only protect the environment, but also ensure payment of a living wage and the provision of benefits to workers.

Despite the positive attributes of a green economy in enhancing growth and creating employment, some jobs will be lost in the transition process. High carbon intensive industries will be required to conduct a skills analysis, due to labour supply and demand.¹³ The demand for green skills will be a challenge during the transition period, as there may be instances of a skills mismatch. A report conducted by Cedefop¹⁴ stated that greening the economy will affect skills needs in three ways:

- i. Structural changes, which will lead to increased supply and demand in some occupations and a decrease in others;
- ii. New economic activities will create new occupations, thus there will be a need for new skills profiles and a qualification and training framework; and
- iii. Occupations and industries will experience green changes, and this will require adjustments to be made to the current training and qualification framework for these occupations.

A report published by the OECD argued that the demand for green skills is driven by a range of factors, including policies that are defined by three main trends:

- i. greening all industries that require the upgrade of skills and adjustment of qualification requirements;
- ii. identifying new and emerging economic activities, which create or renew occupation and related qualifications and skills profiles; and
- iii. structural changes, which should create a need to realign sectors that will meet the demand for green jobs.¹⁵

South Africa may have to import green skills and therefore new policy paradigms must target the long term goals of enforcing skills transfer, avoiding a skills mismatch, and supporting skills demand and supply in the affected sectors of the economy. An example to note is that of a frequently-cited report that argued that the success of Canada's immigration policy depends, among other things, on institutions that link workers to jobs and provide for the international transferability of skills.¹⁶

The report further recommended that there is need for an institutionalised way in which employers can assess the productive value of prospective workers' skills for the positions available. Some of these include institutional arrangements whereby employers in the host country gain access to accurate information about the skills reflected in credentials acquired from specific educational institutions in sending countries; as

well as reliable information regarding the individuals' performance in acquiring their credentials; and lastly the performance assessments of comparably qualified individuals in comparable local employment situations.¹⁷

Although it is often difficult to acquire such crucial information, South African policy makers and employers can make it mandatory that skills transfer is a part of the package that brings skilled immigrants into the country, as there remains a huge proportion of low-skilled citizens who need to be trained. However, in the long run, tertiary institutions such as universities and Further Education and Training (FET) Colleges must play a critical role in the green economy transition by developing new curriculums to advance knowledge through research and innovation. The next section discusses the current jobs and skills shortage in South Africa.

THE NAKED TRUTH ABOUT JOBS AND SKILLS SHORTAGE IN SOUTH AFRICA

Without a doubt, South Africa has been implementing green economy and green growth in progressive ways over the past few years, at different levels of government (national, provincial and local level) and in the private sector. However, the country is facing the dual problem of high unemployment and skills shortages, especially in sectors such as energy, agriculture and transport, which are vital to greening and reducing carbon emissions. The unemployment rate stood at close to 25 per cent in 2014.¹⁸ Furthermore, extant research findings reveal that the supply of South African graduates is insufficient to meet the country's need for skills.¹⁹ In 2015, about 15.3 million people were employed, whilst jobs grew by 203 000.²⁰ The unemployment figure decreased to 25.40 per cent (from 25.50 per cent) in the second quarter of 2014.²¹ Adopting a green growth trajectory will help South Africa to achieve two important milestones, namely alleviating high unemployment levels, and lowering high amounts of carbon emission at the same time. Research by the Centre for Development and Enterprise (CDE) provides an analysis of skills shortages in South Africa, arguing that the supply of graduates is insufficient to meet the country's current need for skills:

Estimates indicate that South Africa needs a further 6 000 civil engineers just to manage existing infrastructure programmes, in addition to around 22 000 more accountants, book-keepers, and similar professionals. Simultaneously, between 1994 and 2006, the number of teachers qualifying in South Africa fell from 70 000 per year to 6 000 (and to slightly over 9 000 in 2013), a third of whom do not intend to teach in South Africa. Between 1994 and 2003, South Africa lost about 120 000 qualified professionals to emigration, with the annual number thought to have risen rapidly every year since then.²²

Other scholars estimate that there will be a shortage of 1.5 million to 2 million skilled workers by 2017.²³ Within the sectors of the green economy, Borel-Saladin and Turok

identified 26 green segments and technologies where skills are in critical shortage in the country.²⁴ Having the right skills, and a sufficient supply of relevant and good skills, is crucial for a smooth transition to a green economy.

JOB CREATION AND THE ROLE GREEN ECONOMY OUGHT TO PLAY IN SOUTH AFRICA

The Copenhagen Climate Summit in 2009 provided many commitments and flagship programmes to respond to the global economic crisis. President Jacob Zuma mentioned that the country is now on a green economy pathway. Amongst many flagship programmes initiated is the New Growth Path (NGP), which aims to create five million jobs in labour intensive industries by 2020.²⁵ Greening the economy in South Africa is expected to come with both opportunities and challenges. An assessment of green jobs in South Africa was conducted by the Industrial Development Corporation (IDC), which identified 26 industries that were divided into four sectors, and which are expected to create green jobs. The following sectors were cited:

- i. energy generation;
- ii. energy and resource efficiency;
- iii. emission and pollution mitigation; and
- iv. natural resource management.

Short-, medium- and long-term employment was believed to be created in all four sectors according to the IDC. Table 4.1 provides an overview of the employment potential (green jobs) in the different sectors and the associated time-frames.

Table 4.1: Estimated employment potential in the four sectors across three time-frames

Parameter	Long Term (8 years)	Medium (5 years)	Short Term (2 years)
Energy generation	130 023	462 000 new jobs	255 000 new jobs
Energy and resource efficiency	67 977		
Emission and pollution mitigation	31 641		
Natural resource management	232 926		

Source: Maia et al²⁶

This table suggests that the green economy can lead to the creation of approximately 462 000 jobs in the long term, nearly 255 000 in the medium term and 98 000 new jobs in the short term.²⁷ In order to achieve the Green Economy Accord target by 2020, green skills

are recruited by all stakeholders involved in the agreement to ensure that critical milestones such as increasing the roll-out of solar projects, implementing energy efficiency in the productive sectors of the economy, waste recycling, etc., become a reality.²⁸

There is, however, a need to exercise caution in estimating South Africa's potential to generate growth in green jobs, including in terms of:

- i. the time-frame and sustainability of green jobs growth, as many jobs will be created in the short term, while long term jobs will need innovation in new technologies and industries; and
- ii. the lack of supply of sufficiently skilled workers.

South Africa is a high carbon intensive country that needs to transition into a low carbon economy.²⁹ This will require increased technical skills, especially in the green technologies sector, for example, solar photovoltaic and smart grid technology.³⁰ Koester emphasises that the shift in technology will require reskilling and new ways of conducting business.³¹ The next section discusses the skills shortage in South Africa and how this affects the transition to a green economy.

THE CASE FOR SKILLS IMMIGRATION IN SOUTH AFRICA

What is pertinent to the picture painted above is that economic growth in the country will continue to be stifled if the urgent need to address critical skills shortages is not taken into consideration. A number of studies recommend that, in order to address the skills shortage, long term and short term goals should be pursued.³² The former would require the government to undertake an aggressive and radical drive to educate and skill South Africans through various tertiary institutions; the latter requires the state to import skills from other countries. Bernstein advocates a two-pronged approach to addressing skills shortages, i.e. programmes are implemented to reskill South Africans, skills from abroad are utilised simultaneously.³³ She argues:

Solutions to the low skills levels in this country will not be achieved overnight, but with its relatively young population, South Africa does not have to wait for the next generation to “catch up”. Adult education, skills-based training and international knowledge transfers can all make an immediate, though limited, impact. It is self-defeating to neglect any of these aspects because of misguided notions of skills migration.³⁴

Former Reserve Bank Governor, Gill Marcus, asserts that ‘for each highly skilled immigrant who comes into the country, between four to eight low-skilled jobs are created’.³⁵ Bernstein also builds a case for skilled immigration as a way to solve the critical skills shortage:

Immigrants can spur growth by: filling the skilled jobs that firms need to fill to expand; providing the entrepreneurial skills needed to start new businesses; and adding the education, training, engineering, medical, and other skills needed to improve service delivery. With smart leadership and policies that put South Africa first, the nation could reap enormous benefits from welcoming the brave, energetic, people – risk takers – who choose to migrate to this country in search of a better life. A sensible and pragmatic approach to skilled migration will contribute to South Africa's growth and economic success. The tough choice here is recognising that high levels of skilled immigration and, by extension, changes to South African immigration policy, are essential – despite being potentially unpopular.³⁶

Indeed, this is a tough choice for the current government, because importing skills from other countries is not without shortcomings.

Political leaders such as Mamphela Ramphele have also weighed in on the need for managing migration in ways that attract the best talent to spur South Africa's economic growth:

We must develop a strategic approach to migration. Our failure to articulate policies that attract and retain skills for our competitiveness has left us in a situation where we have the worst of all sides of migration. Our failure to protect our borders has created a huge burden of uncontrolled economic and political refugees. We should be the magnet for Africa's most talented skilled people and be able to respond systematically to deserving political refugees.³⁷

It is often argued that in order for South Africa to be competitive it needs to abandon its reactive and passive approach to harnessing skilled immigration, because, as a migrant-receiving country, South Africa is losing out on the global 'race for talent' against Australia, the United States (US), Canada, the United Kingdom (UK) and New Zealand.³⁸ These other countries have put in place programmes to proactively recruit skills from regions where skills can be sourced by advertising their countries as viable destinations for prospective skilled immigrants. South Africa should thus ensure that skilled immigration is placed on the national agenda, as part of a package of responses to address skills shortages in the country. In addition, 'skilled immigrants should be required to engage in a mandatory transfer of skills to local workers'.³⁹ The next section discusses the legal and policy terrain of immigration in South Africa.

LEGAL AND POLICY LANDSCAPE OF IMMIGRATION IN SOUTH AFRICA

THE REGIONAL POLICY LANDSCAPE OF MIGRATION

Mobility on the continent is governed by several conventions, treaties, frameworks and discussion documents that have been drafted and ratified by member states of the African Union (AU). A number of key AU frameworks that facilitate free movement include: the Abuja Treaty of 1991; the African Common Position on Migration and Development; and the Strategic Migration Policy Framework. In order to promote freer movement of people across the continent, especially as it pertains to the relationship between migration and development, the AU has undertaken specific initiatives since 2000. These include:

- i. The development of a Draft Strategic Framework on Migration in the early 2000s;
- ii. The formulation of the Migration Policy Framework for Africa in 2006, also known as the African Common Position on Migration and Development (EX.C.L. 277(IX)); and
- iii. The production of the Africa-EU Joint Declaration on Migration and Development at a Ministerial meeting with the EU to discuss migration issues (held in Sirte in December 2006).⁴⁰

At the sub-regional level, various protocols have also been adopted by the Southern African Development Community (SADC). In 1995, the Draft Protocol on Free Movement of Persons in SADC was adopted, which was subsequently replaced by the 2005 Protocol on the Facilitation of Movement of Persons within SADC.⁴¹ Another protocol adopted by SADC member states is the Protocol on Trade in Services for six key sectors namely, construction, communication, transport, energy, tourism and finance in 2007. In March 2008, member states agreed to create a single visa (Univisa), modelled along the lines of the European Schengen visa. Of interest is that within the SADC, only seven of the 14 member countries have ratified Article 14 on free movement (which recommends that visa-free entry for short visits should be encouraged), and South Africa and Zimbabwe still only issue ninety-day visas to regional travellers. South Africa's position with regard to free movement in SADC is one that is largely biased towards bilateral agreements, as opposed to regional agreements.⁴²

LEGAL INSTRUMENTS GOVERNING IMMIGRATION IN SOUTH AFRICA

A number of legal instruments govern national policy on international migration in South Africa. Of these, the Constitution serves as the foremost guide on the rights of immigrants and permanent residents in South Africa. The Immigration Act (No. 13 of 2002) and the Refugees Act (No. 130 of 1998) are the main legal instruments that guide migration

policy in the country.⁴³ The National Development Plan (NDP), Vision 2030, asserts that the relatively unrestricted movement of labour across the region and the continent can contribute significantly to more inclusive economic growth and it therefore recommends the implementation of incentives to attract highly skilled workers to the region.

The Immigration Act (No. 13 of 2002) repealed Apartheid's last draconian law, called the Aliens Control Act (No. 96 of 1991). Through this Act, South Africa's immigration policy became largely biased towards skilled immigration and made it difficult to legalise immigrants who possess low skills or whose skills do not fall in a particular list of skills (for example, exceptional or scarce skills). There are few options that unskilled immigrants can pursue to legalise their stay in South Africa in line with the Immigration Act. The Act sets out the requirements for the various visas and permits that are available to immigrants. South Africa uses a visa regime to decide who may and who may not enter its territory. Passport holders of a number of countries are exempt from visa requirements. Immigrants coming to South Africa can apply for a variety of permits, depending on the reason for visiting South Africa and the length of their stay. Immigrants can apply for temporary or permanent residence permits. The Immigration Amendment Act (No. 13 of 2011) compels the Minister of Home Affairs to compile a 'critical skills list' to facilitate the issuing of work visas. It states that the DHA could draw on the 'national scarce skills list' to compile its own 'critical skills' list.⁴⁴

The Immigration Regulations of 2014 came into effect in May 2014, marking the commencement of the Immigration Amendment Acts of 2007 and 2011. The aims of the new regulations are to ensure the effective and efficient management of migration in the interest of state security, while ensuring that it contributes to the economic development and prosperity of the country. Quota Work Permits and Exceptional Skills Work Permits have been amalgamated into the Critical Skills Work Visa. In order to qualify for this kind of visa, applicants have to demonstrate that they fall in a critical skills category. The published critical work skills list details 11 categories, including agriculture, building, finance, engineering, health and outsourcing. The new list establishes 169 critical skills or occupations, as listed in Table 4.2.

Table 4.2: Skills or qualifications determined to be critical for South Africa in relation to an application for a critical skills visa or permanent residence

Classification of Education Subject Matter	Occupation/ Critical Skill (Examples)
Academics and Researchers	Doctoral graduate (acquired abroad and within South Africa) in the areas of science, technology, engineering and maths, as well as the social sciences
Agriculture, Agricultural Operations and Related Sciences	Agricultural Engineer; Agricultural Scientist; Forestry Technician; Sheep Shearer
Architecture and the Built Environment	Architect; Construction Project Manager; Land Surveyor; Quantity Surveyor; Urban and Regional Planner

Classification of Education Subject Matter	Occupation/ Critical Skill (Examples)
Business Process Outsourcing (BPO)	Software Development Engineer and Manager; Systems Architect, Engineer and Manager; Foreign language speaker for specialist language support and technical or sales support (German, Swiss German, Flemish, Greek, Swedish, Danish, Italian, Dutch, Spanish, Mandarin and French); Business Analyst; Quality Analyst; Quality Assurance Specialist/Auditor; Customer Service Manager/Team Leader
Business, Economics and Management Sciences	Actuaries and Risk Assessors; Corporate General Manager; External Auditor; Financial Investment Advisor
Engineering	Energy Engineer; Metallurgical Engineer; Chemical Engineer; Civil Engineer; Electrical Engineer; Electrical Installation Inspector; Geologist; Industrial and Production Engineers; Industrial Designer; Manufacturing Managers; Materials Engineer; Mechanical Engineer; Mining Engineer; Production/Operations Manager; Quality Systems Manager; Research and Development Manager
Health Professions and Related Clinical Science	Medical Superintendent/Public Health Manager; Public Health Physician; General and Specialist Medical Practitioner; Hospital Pharmacist; Nursing Professional; Veterinarian; Registered Nurse (child and family health); Retail Pharmacist
Information and Communications Technology	CISCO Solution Specialist; Engineers; Solutions Architects in Telecommunications and ICT; Integrated Developers (PHP, Perl, Java); Network Analyst; IT Security Specialist; System Integration Specialist; Enterprise Architecture; Data Centre Operations; Network Specialist (Security); Database Specialist; Microsoft System Engineer; Network Controller; AV Specialist (Anti-virus); Desktop Support Engineer
Life and Earth Sciences	Environmental Engineer; Industrial Pharmacist; Aquatic Scientist; Animal Scientist; Archaeological/Paleontological Specialist; Bioeconomist; Biochemists; Biological Scientist; Botanical Scientist; Geologist; Geophysicist; Marine Bioscientist; Materials Scientist; Metallurgical Scientist; Metrology; Microbiological Scientist; Polymer Scientist; Protein Scientist; Seismologist; Soil Scientist; Toxicology Scientist; Water Resource Scientist
Professionals and Associate Professional	Safety, Health, Environment and Quality Practitioner; Organisation and Methods Analyst (incl. Scheduler, Estimator); Aeronautical Engineer; Physicist (SKA); Solar Physicist; Space Technologist; Space Weather Specialist; Landscape Architect
Trades	Millwright; Boilermaker (for strategic infrastructure projects); Industrial Machinery Mechanic; Pipe Fitter; Double-coded Welder; Rigger; Moulder; Raise-bore Operators and Foremen

Source: Department of Home Affairs⁴⁵

The skills and qualifications listed in Table 4.2 are in line, to some extent, with those in the Green Jobs Report of the IDC.⁴⁶ Professions such as solar physicists, environmental managers and the engineering fields listed in Table 4.2 all fall within the remit of the skills set that South Africa needs. There is a need for the inclusion of specific skills sets in the immigrations skills list, which speaks directly to green jobs. Take for instance one recruitment expert who lamented that South Africa has limited experience of renewable energy projects and ‘for this reason, virtually all the new projects are joint ventures with international companies who present a broader array of skills in this domain. Yet senior

executives of these partner companies are battling to get work permits'.⁴⁷ She also noted that work permits for foreigners with 'scarce and critical' skills appeared not to make any provision for skills in renewable energy.⁴⁸ Major projects, such as the 2010 World Cup and Gautrain, are often cited as examples of projects where local expertise alone could not have achieved the desired goals, because of the shortage in skilled labour to undertake sophisticated construction projects. Sectors that constitute renewable energy would likewise require the utilisation of local and international talent, where the latter could participate in executing work and also in ensuring the transfer of skills to the former. In as much as skilled migration can offer some answers to the country's skills challenges, there are a number of limiting factors, especially because the integration of migrants remains an explosive issue. South Africa continues to find itself in a difficult position when competing with countries considered to be leading migrant destinations, such as Australia, Canada, New Zealand and the US.⁴⁹ These countries are highly competitive and offer migration packages and programmes that are attractive to the best and brightest.⁵⁰ Skilled immigrants from the sub-regions and across the African continent are considered the most likely groups to settle and work in the country, as opposed to skilled migrants from Asia, Europe and North America.

On the domestic front, the South African government has to balance the recruitment of foreign skilled labour with the demand for jobs by citizens – something that has a bearing on the extent to which migrants will be integrated into the local workplace and communities. The outbreak of countrywide xenophobic violence in 2008 and subsequent community upheavals in townships have, over the years, brought to the fore the explosive nature of tension, especially in poor communities, where it is believed that immigrants threaten job security. Because the violence is recurrent, the latest having taken place in 2015 in Durban and parts of Gauteng, it becomes clear that there are deep-seated grievances about re-dress and prioritising citizens' needs, as opposed to searching for skills outside the country's borders.⁵¹ It should also be noted that the challenges related to recruiting and attracting skilled immigrants are of a technical and bureaucratic nature, if one considers that work permits are not issued on time, in some cases, because officials lose applicants' documents and this is not communicated to the applicants in time. Although sufficient empirical evidence is still lacking, conversations with migrant workers in South Africa indicate that brain waste is a possibility, especially if immigrants struggle to find appropriate work upon arrival in South Africa, resulting in them having to take other jobs in order to survive. It is hardly surprising to see migrants placed in a position where their skills fail to match what local recruiters deem important, or where they fail to be recruited because recruiters have to meet the requirements for EE/AA jobs versus skilled immigrants.

CONCLUSION

The green economy is a viable option for creating the much needed jobs that many unemployed job seekers in South Africa yearn for. This study has shown that since South Africa is faced with the dual problem of high unemployment and critical skills shortages, the short term remedy would be to import skills that would contribute to growing the economy, in order to sustain economic growth and, in turn, create low-skilled jobs. However, if government and higher education institutions continue to work in silos, creating green jobs and skills within the green economy will be a challenge and a slow process. Furthermore, the DHA needs to update the Scarce Skills list to include specific green skills that are not in the list already. By updating the list, this will attract more people with specific skills that could contribute to greening the economy and it would also enable the transfer of skills. There is no denying that the South African government has put a number of policies and strategies in place to promote green jobs and green skills, however, recruiting and attracting skilled immigrants remains a problem in terms of inefficient bureaucratic administrative processes.

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PART III

Reflections on Sustainable Development

Relearning Our Wants and Needs for Sustainable Development

Vuyo Mjimba

ABSTRACT

This commentary chapter considers the possible contribution of the wide application of the differences of the 'wants' and 'needs' concepts in propelling the sustainable development agenda. Following a review of literature that supports the notion of continuous change in economic, environmental and social standards, the commentary argues that the notion of the future we want has outlived its usefulness. Instead, it suggests a transition to a new concept of the future we need, concluding that sustainable development is a need and not a want. This transition is important in addressing problems associated with the differences in the development status of economies and continents in the context of engaging with the sustainable agenda.

INTRODUCTION

Growing up, I thought I was going to be a successful musician. Watching and listening to one of the greatest musicians of my era, George Benson, I could visualise my bright future in the music industry. More than 35 years on from the dreamy years, I am a researcher in the sustainable development space and the words of one George Benson's songs still echo in my mind. The words were to the effect that everything (and everyone) must change because nothing and no one stays the same. Indeed, things have changed and change is inevitable! I abandoned the quest for a career in music before it even started. Colonialism and apartheid have ended on the African continent. The Berlin Wall and the once 'great' Soviet Union have disintegrated; China has adopted a new 'socialism with a Chinese twist'; and the mobile phone has penetrated almost every society. These are a few of many changes that are happening and more will follow.

One of the greatest changes of the last two decades is the realisation and general acceptance that, in the long run, a number of anthropogenic activities are not neutral to the environment and human well-being. Instead, some of these activities have been and continue to be the major source of environment linked challenges, which include land degradation, water pollution and, most notably and of great concern, climate change. As expected, humans have been spurred to act and manage the negative impacts of a variety of anthropogenic actions. A prominent response in this arena arguably falls under the broad umbrella of sustainable development, which was the major propellant of the vision of Rio+20 outcome: 'The future we want'.¹ The envisioned future is one that achieves equilibrium between economic development, environmental sustainability, and improving human welfare by eliminating poverty, creating employment and ensuring social justice. It is indisputable that, to date, the changes that have been made to realise this wanted future have been inadequate. The inadequacy arises from the fact that some of the activities that create disequilibrium are at the core of modern views of being considered developed and wealthy. For example, a reliable and adequate supply of electricity, regardless of its source, is viewed as better than a supply deficit. Also, owning and driving some brands of big petroleum-consuming motor vehicles is viewed as a sign of wealth and affluence and many aspire to attain that standard. Based on these and similar views, sustainable development has been criticised as being overly focused on economic issues at the expense of social and environmental concerns.² Additional criticisms include allegations of the concept being dominated by Western perceptions and its alleged disregard for inequalities between and within countries.³

This commentary chapter emerges from this background to explore the thin line that separates sustainable practices from unsustainable ones. This is explored through the lens that differentiates needs from wants. Lodged in the economic component of the sustainable development concept, the chapter seeks to initiate discourse regarding the shifting of views and perceptions of sustainable development as being a *need* and not a *want*. The argument is unpacked in the following five sections:

- i. a methodology section that outlines the basis of the commentary;
- ii. a section with sub-sections exploring the wants and needs concept and the broad perspectives of the sustainable development concept;
- iii. a section that presents change as a normal process of life;
- iv. a section that presents the case for the future we need; and
- v. finally, the last section, which presents the commentary conclusions.

METHODOLOGY

The primary objective of this chapter is to present a case for beginning a discourse regarding a transition from a ‘the future we want’ paradigm to a ‘the future we need’ paradigm. To this end, the commentary employed the discourse analysis approach to examine issues that could explore the nature of the determinants that could be useful in addressing the sustainable development agenda, both in theory and in practice. To that end, the chapter adopts the discourse analysis approach. Discourse analysis refers to the study of ways in which written and spoken language is used in a running discourse between various parties in a specific situational context.⁴ It is concerned about how texts are constructed within the context of social and historical settings and situations.⁵ In this commentary chapter, the analysis examines texts pertaining to the needs and wants concept and change as an inevitable process, paying attention to how these have changed and how they can impact the sustainable development discourse.

DEFINING CONCEPTS: WANTS AND NEEDS

In this chapter, the discussion of what constitutes a ‘want’ and a ‘need’ will have its foundation in economics and its sub-branches. A literature search of the theoretical foundations of the two terms reveals the paucity of up-to-date discourse. A close examination of the available literature reveals that the two terms are often used interchangeably. Where there are attempts to separate the terms, their complex and dynamic interaction often leads to their conflation for simplicity. This arises from the fact that the terms have moved outside the borders of traditional economics. They are now used in a variety of fields, which include: health care, sports management and environment management discourse. In these fields, they are a major driver of the nature of personal behaviour and public and private policy.

At its most basic level, a ‘want’ can be described as something one can desire to have, but it is not absolutely necessary to sustain life.⁶ An example is music, which some people argue they cannot do without, but in absolute terms it is not a determinant of human (or other animal) survival.⁷ In contrast, a ‘need’ is something that has to be available to ensure survival.⁸ Food is a good example of a need, because without food no animal can survive. The nature and type of food may vary, but it has to be available.⁹ Despite these differences, the terms want and need are often used interchangeably. This is because the two can be conflated. This arises from a different perception of wants and needs. Witt¹⁰ explains this perception by positing that wants arise from a combination of a state of deprivation and consumption knowledge both which are anchored in non-cognitive and cognitive aspects of human behaviour. From this, Witt distinguishes basic and complex wants. Basic wants constitute what are in fact needs. They include air to breathe, food and the means to remedy threats to good health. Maslow¹¹ locates basic wants under

the broad category of basic needs. He states that the most basic human needs are those that are essential for human existence and distinguishes two types of such needs. First, there are physiological needs, which are absolutely necessary for one's survival. They include the need for oxygen, food, and sleep. The second type of basic need is the need for safety, which ensures the continuous ability to meet physiological needs. Examples of such needs include the need for shelter or housing, the feeling of being protected by the law, and the physical ability to defend oneself against various forms of threats.¹²

Maslow also distinguishes another category of needs. He refers to these as higher-order needs (which are in fact wants). He defines the three types of higher order needs as:

- i. Social needs, which include friendship and companionship and related matters. This is important for creating a sense of not being alone in the world and provides a sense of belonging;
- ii. Esteem needs, which pertain to social status. Status is based on the feeling that one has regarding contribution, recognition and rewards - both domestically and at work; and
- iii. Self-actualisation needs focus on personal growth, problem solving and life appreciation, among others.¹³

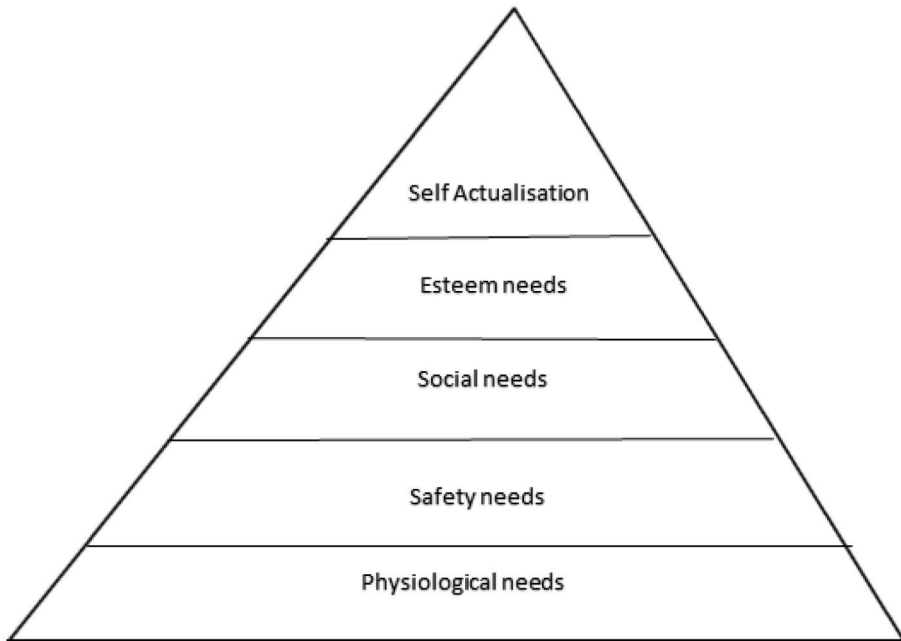
A distinguishing feature of Maslow's basic needs (Witt's basic wants) is that they can be satisfied by both direct and indirect consumption of inputs meant to address a specific deprivation. For example, the need to satisfy hunger or thirst is directly addressed by consuming food and drinking water to quench a thirst. Direct consumption is distinct in that it reaches a level of satisfaction beyond which further satisfaction may lead to aversion. However, the needs arise regularly because the normal activity of an individual consumer (a human or any living organism) uses up the inputs consumed to satisfy those needs.¹⁴ Indirect consumption relates to needs like shelter and warmth, which are satisfied by employing tools. Examples of related tools include clothes, shelter and heating, as tools for meeting the need for warmth, safety and security. Tools are also the source of fulfilling wants. For example, a radio or television set is used to provide both entertainment and information that the user may apply in daily life practices.

Fulfilling a want is not necessarily driven by a deprivation. It is partly driven by perceptions that associate tools and wants, and partly by a combination of associating needs with wants.¹⁵ The perceptions grow from experiencing services provided through specific tools and knowledge of these tools. Further, the consumption of services provided by these tools changes over a period of time. The change is driven by novel singular and/or combinations of ways of addressing these wants. Learning about the different combinations of tools and experiences to satisfy wants is the essence of associative learning. The associative system is intuitive, automatic and uncertain. It is the determinant of favourable or adverse responses to some aspects of the environment, which include satiation and fear among other responses or feelings. This learning, together with constant and

persistent change in the way and the combination of ways in which wants are satisfied is the motor driving modern consumption expenditure.

Maslow argued that meeting basic needs (basic wants according to Witt) is necessary for preparing the conditions for addressing and meeting higher-order needs. This resulted in a hierarchical ordering of Maslow's needs in an arrangement that is commonly referred to as Maslow's Hierarchy of Needs, which is shown in Figure 5.1.

Figure 5.1: Maslow's Hierarchy of Needs



Source: Maslow¹⁶

The need to systematically address lower order needs, before progressing to the others in the hierarchy, has given rise to the fulfilment progression concept.¹⁷ However, further work done on Maslow's Hierarchy of Needs concept disputes the fulfilment progression concept. For example, Alderfer posited that human needs are addressed simultaneously and in no specific order.¹⁸ For example, some individuals may sacrifice the basic need for shelter in order to fulfil their artistic ambitions. Similarly, a professional soccer player who practises a particular technique well-after the soccer club's prescribed time for practise may be engaged in that act to simultaneously increase his/her worth (pay/wages, which relates to existence) or simply to increase self-esteem, as the best footballer in that technique.

Accepting this stylised conception of wants and needs suggests that it is plausible to shape the trajectory of the means to satisfy human wants and needs. This implies that through constantly changing the means to satiate wants and needs, it is possible to gradually move towards the ideals of sustainable development.

SUSTAINABLE DEVELOPMENT: A BROADER VIEW

The term sustainable development is becoming a *cliché*. This is because it is used to either correctly or incorrectly justify or dismiss a variety of projects, actions and policies. This arises from the fact that sustainable development is a multi-faceted, complex and dynamic concept that is anchored in the realms of politics, economics and social systems whose perceptions vary across human societies. A common definition of the term is that from the Our Common Future report, prepared by the World Commission on Environment and Development, in which sustainable development is defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.¹⁹ This definition, comprises three concepts, namely: development, sustainability and social concerns. It alludes to the quest for a balanced consideration of economic and environmental concerns in the quest to improve human welfare.

The development component of the definition pertains to economic development. In traditional economics, economic development is characterised by continually increasing income and consumption levels, particularly for the poor.²⁰ The process also involves increasing benefits, such as improved health and education services. In this respect, this view incorporates a social dimension. A fundamental tenet of the traditional economics view is that economic development can be sustained in perpetuity by adequate investment in new capital and the maintenance of high productivity levels high enough to generate the required increases in future consumption.^{21,22} The immediate benefits of such an industry include increased and sustained employment and profitability, and may even spur the growth of a variety local consumption linkages in both the goods and service sectors. These outcomes (employment, profit, high productivity and consumption) characterise the classical view of economic development. In a sense, they are the ingredients of a different type of 'sustainable development'. This assertion arises from the meaning of the word 'sustainable' which include; 'able to last or continue for a long time' and 'ability to be used without being completely used up or destroyed'. This implies that as long as there is high consumption of goods or services and productivity is high, then development to meet that consumption will be sustained, *ceteris paribus*. A fundamental flaw of this view is that it disregards some externalities, most notably the negative externalities of high productivity and consumption of some goods and services. For example, high productivity in factories powered by coal-generated electricity may be good in ensuring continuous production and employment, but it may have detrimental environmental impacts.

In addition, it is known that the assumption of *ceteris paribus* is a pie-in-the-sky assumption and is mostly useful in classroom explanations. In reality, the world is highly complex and dynamic to simultaneously hold a number of factors constant. This realisation has important implications for environmental sustainability, as evidenced by the rather delayed concerns about environmental sustainability in the economic development and growth discourse. Two examples illustrate this point. The first is the discrepancy between laws pertaining to sound environmental management, on one hand, and those pertaining to safety and other issues, on the other hand. In general, laws pertaining to the latter developed earlier and faster than the former. The legislative history of South Africa illustrates this point. Examination of the history of legislation shows that whereas the first comprehensive legislation that attempted to manage the adverse environmental impacts of mining in South Africa was enacted in 1956 under the Mines and Works Act, other mining regulations date back to the 1800s.²³ Although the new regulations have begun to pay attention to the environmental aspects (particularly post-1994), it is argued that the regulations have come rather late. The acid mine drainage challenge in the Witwatersrand area and beyond is an example of the results of lagging environmental management legislation.²⁴ The second example is the case of the United States of America (US) not ratifying the Kyoto Protocol. The main argument has been that ratifying the protocol would have jeopardised the US's economic recovery process.²⁵ These cases illustrate the view that divorces economic growth and development from environmental stewardship, which is contrary to the sustainable development agenda. The result is that current wants end up over-shadowing future needs – a situation that has to change rapidly if the objectives of sustainable development are to be met.

CHANGE IS THE ONLY CONSTANT

The phrase 'change is the only constant' is attributed to Heraclitus, the Greek philosopher whose writings are said to advance the case for independent thought.²⁶ An observation of major shifts in paradigms in different theoretical and practical fields confirms that change has indeed been the central feature of different societies. There are many changes that are driven by social, scientific and economic discourses. Major change includes: the shift in the view of the earth as being flat to that of it being a globe; the emergence and changing relationship between the royals of England and their subjects, as articulated in the Magna Carta and subsequent amendments; the disintegration of the Union of Soviet Socialist Republics; the end of colonialism and Apartheid, *inter alia*. Adelman narration of changes in the dominant post-Second World War paradigms in the field of development economics illustrate the notion of change as 'the only constant'.

Adelman, proffers that changes in knowledge (learning), ideology, the international and domestic environment have been key in the changing dominance of the various development models that have characterised different, and sometimes overlapping,

thinking from the 1940s to the late 1990s.²⁷ The scholar chronicles the different models adopted in the various pursuits of economic development as was believed to be driven (or constrained) by a single factor, the factor X. In the 1940s to 1970s, factor X was considered to be physical capital. This view was based on the results of the Marshall Plan, which drove the reconstruction of western Europe after the Second World War. This consideration was the basis of the Brenton Woods Institutions' funding of projects relating to transport networks and energy infrastructure in developing countries. The thinking was that the funding was addressing low domestic savings levels in developing countries that were so low that could not finance large capital projects which, once developed, carried positive externalities critical for economic development. However, the social, environmental and macro-economic impacts of this financing were not considered. The disappointing outcomes of this approach as, applied in some African, Latin American and Asian economies, led to the consideration and the rising prominence of other factors. In the period 1958-1965, the concept of entrepreneurship was considered a critical constraint to economic development. This changed to incorrect relative prices (1970-1980), which in turn changed to the view that an unfair international trade regime (1980 to date) was detrimental to the development of industrially lagging economies. Later on and advanced by the monetarist Reagan administration (1980-1986) a hyperactive government was viewed as being detrimental to the development of industrially lagging economies. Factor X has also been posited as human capital (1988 to date) and ineffective government (1997 to date). An outcome of the changes in what Factor X is, is the realisation that economic development and growth cannot be attributed to a one factor acting singularly. Instead, development is facilitated or impeded by a combination of factors acting in synergy. An examination of the determinants of economic development experiences of the high performing East Asian (HPEA) economies confirms this observation. Important for this chapter is that there has been constant change in the thinking guiding the pursuit of economic development.

While there has been acceptance that there is no single factor that can stimulate and maintain development and growth, there have equally been changes in the consideration of the role of natural resources in the economic development and growth arena. This quest can be traced back to the nineteenth century. During this era, classical economists recognised the contribution of nature (mostly land) in economic development.²⁸ Labour and land were regarded as important factors of production. However, there was no consideration and acceptance of nature's services in relation to human and environmental development. Land was regarded as a factor of production in terms of generating rent. Technological development during the industrialisation in the nineteenth century reduced the consideration of nature as an important factor in economic development and growth. The focus changed to labour and capital as important factors of production.²⁹ This change in focus partly led to the demise of classical economic views. A predominant view of this change was that technological innovation meant substitutability between production inputs like capital and land (nature). For example, Solow^{30, 31} argued that nature's

contribution to production could be substituted by manufactured capital. Inevitably, this view has also changed, most notably in the later part of the twentieth century. The change has been driven by the realisation that human endeavours for economic development are not neutral to the environment, and do not always result in the desired outcomes of social development. The new focus is sustainable development, which seeks the simultaneous and balanced development of economic, social and environmental endeavours. This new thrust is attributed to the ongoing and now almost successful effort to spread the sustainability message beyond government environment ministries to others, most notably the economics and social development ministries. This is largely credited to a global effort, championed by the World Commission on Environment and Development (WCED), which was established in 1983.³² Although the sustainable development concept remains accused of treating environmental consideration as an 'immigrant' in land of economic and social development, the concept has nevertheless led to the frequent and perhaps greater consideration of environmental concerns than previously was the case.

Nhamo³³ and Pistorius³⁴ also demonstrate the potency of Heraclitus' assertion of change being the only constant. The scholars narrate events that saw the emerging of the reducing emissions from deforestation (RED) agenda which changed to be the reducing emissions from deforestation and forest degradation (REDD) and finally to the current reducing emissions from deforestation and forest degradation plus (REDD+). On behalf of the Coalition of Rainforest Nations, Costa Rica and Papua New Guinea resuscitated the RED agenda in climate negotiations during the eleventh Conference of Parties (COP) meeting (COP11).³⁵ Their concern was the deficit of the Kyoto Protocol with regards to GHG emission that result from deforestation in developing countries. The main objective of RED was to reward communities that preserve their forests through ensuring that consumers elsewhere pay for environmental services provided by the preserved forests. Implicitly, this meant that developed economies were to pay developing economies for preserving their forests. The dynamics of implementing and analysing the policy and practical implications of RED influenced subsequent changes in both the form and name of the drive. The first movement was driven by a need to deal with the technical and political issues regarding the RED concept (perhaps drawing from lessons in the development economics space). Through two expert workshops held in 2006 and 2007, it emerged that forest degradation was a key consideration, as it marked the genesis of planned or unplanned land use changes and thus played a key role in emissions management.³⁶ The result was the addition of a 'D' to RED to make REDD during COP13 in Bali in 2007. The plus (+) to make REDD+ came as a result of concerns regarding effective monitoring, reporting and verification. Under RED, the monitoring, reporting and verification process employed simple, available and cost-efficient remote sensing techniques. Under REDD, effective monitoring, reporting and verification process dictated a complex system to account for changes in carbon stocks.

The examples of change in thinking and practice narrated in this section illustrate that change is an inevitable result driven by transformations in thinking deriving from

the constant development of knowledge, perceptions and beliefs. In the same vein, this chapter advances the notion of a shift from a sustainable development agenda, framed as *The future we want*, to that of *The future we need*.

OUR FUTURE: FROM A WANT TO A NEED

Although desirable in the short to medium term, turning sustainable development from the entrenched *future we want* mindset to a *the future we need* mindset is not going to be a straightforward or easy task. The journey towards a truly sustainable and developed world will be characterised by changes in production, consumption, and social patterns and practices. Lessons from Heraclitus and others point to the fact that the most appropriate and relevant changes, both in form and magnitude, are not only desirable, but inevitable. Thus a time will come when sustainable development will inevitably transform from a *want* to a *need*. This position is premised on the fact that the current economic development paradigms have been preoccupied by fulfilling human wants to the detriment of equitable economic development (and growth), and improvement in social and environmental well-being.

The point of departure to this assertion is the dismissal of the micro-economic theory position that views the consumption of goods and services as being lodged with given tastes, and that consumers consume only what they can afford. This is because, in my opinion, this view is rather static. As established earlier, humans are subject to change and the pattern of goods and services consumption is equally subject to change, as dictated by perceptions of what is viewed as desirable or undesirable. So, their consumption patterns are not a given, but are rather constructed through cognitive and non-cognitive experiences. Changes in the patterns, magnitudes and perceptions of consumption grow from experiencing services provided through specific tools and knowledge of these tools. Accepting this position, it then becomes plausible that humans can be taught or even forced to 'unlearn' practices that limit progress towards sustainable development goals. I posit that distinguishing needs from wants is a significant aspect of the unlearning process and illustrate this position through energy consumption examples. Before proceeding with these illustrations a detour may be appropriate, so as to accept the current realities.

The majority of modern conveniences are anchored in energy supplied as electricity and liquid petroleum products. These energy types power the majority of modern means of production and delivery of goods and services to consumers. A closer look at these energy sources reveals that they power both our needs and wants. For instance, electricity offers the means to cook food and provide both warmth and cooling, all of which are (true) basic human needs. It also used to address human wants. For example, the energy types can also be used to power tools such as radios and television sets all of which fulfil human wants. Of concern to this commentary is that, to a large extent, the dominant

energy sources are not always neutral to the environment. Fossil fuel-based energy has been proven to be a major contributor to GHG emissions, which drive global warming and results in climate change. Climate change counteracts the goals of sustainable development through its adverse environmental, economic and social impacts. Despite this knowledge, fossil fuels-generated energy continues to dominate global energy supplies.³⁷ The question is: Why is the status quo maintained? The answer lies partly in the argument that economic development is often prioritised over the other aspects of sustainable development. In principle, moving towards sustainable development dictates a need to either eliminate or minimise the use of fossil fuels. However, this has to be realised without further worsening the current global energy supply deficit to levels that compromise economic development and growth and result in adverse human well-being impacts, such as loss of employment.

A plausible, but very likely contested, route towards this end could be to revisit what are **real** wants and needs (emphasis added). The revisit should aim to ensure that addressing human needs receives higher prioritisation than addressing human wants, especially with regard to fossil fuel consumption. For example, it is widely accepted that the transportation of food and other goods by rail, ships, aeroplanes and motor vehicles has been and continues to be a major driver of the growth of global trade and globalisation.³⁸ Although the benefits of both global trade and globalisation are not equal, the benefits of wider and cheaper distribution of a number of consumer and capital goods is beyond dispute. A caveat in terms of these benefits is to realise that this transport network also distributes wants. Against the background of the argument that cleaner alternative energy technologies are yet to reach the technical levels and efficiencies inherent in the long-established fossil fuels, a compromise in minimising transported-related GHG emissions from transporting human wants may be necessary. However, addressing this consideration is difficult, because, currently, views on the wants and needs concepts are both different and conflated. The difference and conflation is partly based on the level of development of an economy. In developing countries, the focus is on ensuring adequate supplies of food, shelter, security and housing; these are issues that developed economies do not often struggle with. Developed economies' focus is on what citizens of the developing world may refer to as the better things in life. This does not mean that citizens of the developed world do not need or consume basic needs. Instead, their basic needs are almost 'guaranteed', while there are deficits in developing countries. A contentious point is that some of these better things in life have 'evolved' and 'assumed' a need status in developed countries. For instance, access to the internet, irrespective of how it is powered, is now considered a need in many developed countries. The internet is a need (and tool) that facilitates a variety of activities and lifestyle choices. For example, it has enabled people to work from home and pay bills without physically travelling to the site of work or payment. Also, for many parents in the developed economies, the convenience of a working and reliable internet service enables the simultaneous pursuit of economic activities of work to earn an income to fulfil basic needs and the social

activity of frequently playing an active role of raising children, through the enabling the 'working from home' concept. Curtailing this tool based on the fact that it is powered by an environmentally (and eventually socially) deleterious energy source may prove difficult to sell in developed economies. In these and similar situations it can be argued that the differences in the perception of wants and needs contributes to the view (and it is correct to a large extent) that, in practice, the sustainable development concept places greater emphasis on economic development and growth than it does on environmental and social development. This position mirrors the views of the economic historian Offer, who argues that modern means of satiating materialist needs (the wants), instead of addressing material needs, are at the core of a number of contemporary societal problems, including increased indebtedness to meet the wants of modern living, and other related stresses of modern living.³⁹

Clark provides an example of this conflation in a study of the perceptions of basic human needs in the Western Cape province of South Africa.⁴⁰ The research findings show that respondents prioritised jobs, housing and education over access to good food, family and health (among others). He states that lower consideration of good food and health indicates the respondents' awareness of 'better things in life'.⁴¹ The big question is: What are these 'better things in life' and what implications do they carry for the sustainable development agenda? A simple answer to this question is that the majority of the 'better things in life' are wants and the minority are needs. Accepting this position, it becomes justifiable to emit GHGs in the process of meeting needs. For example, delivering nutritious food to a community that is afflicted with a nutrient disorder, using a mode of transport that emits large quantities of GHGs may be justifiable. However, the justification cannot be without boundaries and is thus only justifiable in the short run. This means that energy efficiency and alternative energy projects still remain imperative.

The biggest challenge is in terms of consuming fossil fuel to meet modern wants. An example is presented to illustrate this challenge. I posit that wants are the basis of what drives modern economies and the world has in fact innovated to drive the 'wants' industry. One such innovation is trying to address the affordability constraint of wants. Through a variety of credit instruments, the demand for wants has been created. There is a wide variety of credit facilities for want tools, such as television sets and household furniture; but such facilities are very limited when it comes to needs such as food and household heating and cooling. This is not a widely discussed aspect of liberal economics and its related derivatives. More important is that the credit facilities for wants remain viable, because wants evolve through experiencing or learning about new products and services and learning new combinations of consumption. This process is continuous, meaning that demand for inputs, i.e. energy to ensure its continuity, is also continuous. This carries a number of important lessons for the sustainable development discourse.

An example of such a lesson relates to a possible requirement for a transition towards disincentivising the credit market in terms of wants that retard advances in the sustainable development agenda. This is a difficult task. It involves alerting affluent individuals

from both developed and developing countries to forego some of the wants that have assumed the status of a need. Another important task is moving towards a common perception of wants and needs based on the objectives of sustainable development and emphasising the projected consequences of failure to embark on this route. From all current viewpoints, this is almost an insurmountable task. However, accepting that change is the only constant implies that the beginning of such a transformation is inevitable and perhaps long overdue. This change, like all the other thousand-mile journeys, will begin and if it has an end, it will also end with a single footstep.

CONCLUSION

The global quest to realise sustainable development is likely to remain one of the topmost global objectives. However, global inequalities and inequities are likely to continue to render the realisation this objective an impossibly fast moving target to attain. The source of difficulty in attaining the sustainable development objectives is the faint distinction between economic and human welfare that makes it difficult to consider environmental welfare appropriately as being the third component of sustainable development. I have argued that this faint distinction is resident in the equally faint and unequal distinction of what constitutes the absolute *must have* for humanity as being distinct from the *nice to have* - the wants and needs. Therefore, to entrench the sustainable development code, both in policy and practice, dictates the re-basing of the notion of inclusive economic, human and environmental well-being, in a manner that addresses basic universal needs, irrespective of status by any measure. In this re-basing process, policy makers and implementers have to take care that vested interests do not capture the desired wants and needs balance. This is a tall order that the world is perhaps yet to fully comprehend.

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6

‘We Think We’re Helping, But Are We Really?’

Critical Reflections on Engineering for Sustainable Development

Mikateko Höppener

ABSTRACT

Although there has been a rise in the inclusion of courses that focus on sustainable development in engineering curricula across the world, few studies interrogate the effects of these courses on future engineers. Moreover, those that do are written from a global North perspective, based on data from the global North. In order to help fill this gap in literature, this chapter presents contrasting and critical views on engineering education for sustainable development, from the viewpoint of engineering students, lecturers, and industry representatives in Germany and South Africa. This qualitative data was gathered through semi-structured interviews and focus group discussions, which were collected for the purposes of a PhD study. The findings illustrate ambiguity about the notion of ‘engineering for sustainable development’ and mixed views concerning the extent to which engineers are able to use their skills, knowledge and effective power as professionals who contribute to solving sustainability challenges in a just way.

INTRODUCTION

Engineering solutions have traditionally been seen as examples of development that works for all people by advancing human productivity and prosperity. This is because engineering activities usually result in the creation of social artefacts that have come to be recognised as manifestations of development, for example, infrastructure in the form of railways, roads, mechanised forms of transportation, electricity, and so forth. It is therefore often taken for granted that the education and training received by engineers enables them to respond appropriately to the challenges of sustainable development through their contribution to the design and creation of innovative processes

and products, for example, using biogas, which is made from the anaerobic digestion of organic matter, as a source of renewable energy. However, engineering education has traditionally emphasised mastering technical subject matter at the expense of promoting values that underpin sustainable development; hence, not all engineering contributes to sustainability.

The last few decades have seen a rise in the promotion of education for sustainable development (ESD), as opposed to a primary focus on education for employment. This has created the impetus for sustainability to become a new paradigm in the complex systems of universities.^{1,2,3} Moreover, it has led to the inclusion of courses on sustainable development, particularly in engineering programmes. The United Nation's (UN) declaration of the years 2005-2014 as being the 'Decade of Education for Sustainable Development' (DESD) is a good example of an initiative to promote education and learning as the basis for a more sustainable world.⁴ The major goals of the DESD were to embed sustainable development into all learning spheres, reorient education, and develop initiatives that highlight the special role and contribution of education in our pursuit of sustainable development.⁵ Whereas relevant interest in the DESD has been demonstrated at a regional level and by some nations, the conceptual vagueness of sustainable development and the diversity of responses to ESD do not always invite policymakers or practitioners to engage with this agenda.⁶ Despite these challenges, the DESD raised expectations amongst ESD stakeholders, who see this platform as a good opportunity, not only to embed ESD at all education levels, but also to influence government decisions and to move towards social and economic systemic change.⁷ As such, promoting ESD in universities and particularly within engineering programmes is about engaging and empowering people in sustainable development, through seeking their commitment to it, and giving them power to make decisions and bring about changes that are consistent with sustainability principles.⁸

Although there is evidence of progress towards sustainable development practices in engineering, there are numerous examples of engineering outcomes that are unjust. For example, products of engineering, such as luxury vehicles, often perpetuate inequality by primarily serving the needs of the wealthy and not those of poor and marginalised communities (to which priority should be given). This indicates that some social artefacts that are designed to promote development and result in a better life for all can have the opposite effect on the world's poor. From a social justice point of view, an issue of concern is that, in most parts of the world, the conventional use of urban space is limited to the wealthiest citizens who reap the benefit of public investment in infrastructure, while the less privileged have restricted and problematic access to it.⁹ This is more likely linked to political decisions and interests than to the engineered product itself. While it can be argued that such decisions are usually made by politically active decision makers, rather than engineers, no engineering product is value-free, and engineering education ought to emphasise this. Although it can be argued that all forms of development benefit all sectors of society through a 'trickle down' effect of economic activities, the urgency of poverty and inequality deserves attention and intervention that is much more direct and

inclusive. This fact is emphasised in the United Nations' Sustainable Development Goals (SDGs).¹⁰ Goal 1 seeks to 'end poverty in all its forms everywhere', because humanity remains at a defining moment in history, where we are still confronted by: the perpetuation of disparities between and within nations; high levels of poverty; and the continuing corrosion of ecosystems on which we are all dependant for our well-being.¹¹ The 'what' and 'how' of engineering education determines whether or not future engineers will care about reducing inequalities in society, and whether or not they develop an interest in becoming politically active agents of positive change and human development.

Broadly speaking, engineers often work at the forefront of development projects, and their work places them at the interface of the pillars of sustainable development: the economy, the environment, and people.¹² Of course, there is a wide range of engineering disciplines, and different opportunities for engineering work that lend themselves to autonomous decision making, depending on each engineer's fields of focus or the kind of education and training provided by a particular higher education institution. Ideally, all engineers should have the capacity to think critically about the work they are doing and the potential consequences of each engineering product they help create to serve various societal needs. Therefore, all engineers (and other professional groups who work at the forefront of development efforts) ought to be equipped with knowledge and values that can aid them in making appropriate judgments about technologies worth pursuing and products worth creating to achieve sustainable human development for all.¹³ This means development that is explicitly geared towards eradicating poverty and achieving social justice through enhancing valued opportunities for all.¹⁴ Using Amartya Sen's capability approach (CA), this chapter provides a normative critique of engineering outcomes and products, drawing from qualitative empirical data that captures perspectives from engineering employers, engineering educators and engineering students from Germany and South Africa. As such, the chapter builds on and contributes to literature that highlights the need to reconceptualise 'development' from a CA perspective, before efforts to sustain it are pursued.^{15,16,17}

Having provided the introduction to this chapter, the next section discusses the theoretical and conceptual foundations that underpin it. Thereafter a discussion on how the qualitative, empirical data was collected and analysed is presented, before moving on to the findings. As the findings will show, there is ambiguity about the meaning of 'sustainable development' and much doubt concerning the extent to which engineers can use their skills, knowledge and effective power as professionals to advance it.

THEORETICAL PERSPECTIVE

THE CAPABILITY APPROACH (CA)

The CA is a broad normative framework rooted in a philosophical tradition that values individual freedom, and it is used for the evaluation and assessment of individual well-being, social arrangements and the design of policies and proposals about social change.¹⁸ It conceptualises development as freedom, where the effective opportunities people have to be and to do what they have reason to value serves as a proxy of development. Based on this view, human freedoms, effective opportunities or human 'capabilities' lie at the heart of development.¹⁹ When that which is effectively possible has been attained or achieved, it is known as a 'functioning'. A functioning can therefore be described as the realised potential of capabilities; characterised by 'beings' and 'doings' that are (usually) aligned with an individual's aspirations and/or well-being.²⁰

The CA draws attention to two distinguishable yet equally important and inter-dependent aspects of human life, namely well-being and agency. Agency is defined as the capacity to initiate an action through formulating aims and beliefs, and it requires mental health, cognitive skills and opportunities to engage in social participation.²¹ The concept of agency is more wide-ranging than personal well-being; this distinction is important because it underscores that individual choice can be influenced by the social and relational environment in which one lives, which can result in decisions that are not particularly conducive to individual well-being.²² Thus conceived, 'there is deep complementarity between individual agency and social arrangements' and it is 'important to give simultaneous recognition to the centrality of individual freedom and to the force of social influences on the extent and reach of individual freedom'.²³ This means that although individuals may be free and able to pursue valued objectives, social arrangements can have an effect on the resultant choice of action individuals may take. For example, budget constraints enforced on engineering projects by senior management in a construction firm may inhibit engineers' freedom to design environmentally friendly products. This could lead to decisions that prioritise economic profit over sustainable engineering practices. This example represents a situation where, despite having the freedom to decide otherwise in theory, an individual may make a decision that is:

- a) not necessarily aligned with his or her intrinsic motivation;
- b) may not reflect his or her aspirations, and;
- c) has the potential to diminish his or her professional well-being.

Unfortunately, current global economic conditions are not conducive to these freedoms in the engineering industry. Traditional business models that emphasise maximising profit and minimising cost dominates industry, with the result that the economic dimension of sustainability is usually prioritised at the expense of social and ecological dimensions.

Ideally, one's social environment should offer a space in which the freedom to strive towards intrinsically valued 'beings' and 'doings' is provided. For engineers specifically, their professional environment should offer a space in which they are free to strive towards advancing sustainable development and social justice. Correspondingly, engineering education should offer possibilities to develop graduates' capacity to value principles of social justice and sustainable development, so that they have reason to value these ideals and hence work towards them through their professional functioning, i.e., so that future engineers might become agents who act to ensure inclusive sustainable development interventions. Therefore, agentic engineers can be described as individuals who seek to:

- Pursue goals that they value, in particular, goals that are aligned with the principles of social justice, such as poverty reduction.
- Apply their effective power, not only according to their individual agency, but also according to what engineers can do as members of a group, for example, as members of Engineers Without Borders, or as members of communities or political communities.
- Pursue individual well-being or other reasonable and justifiable objectives that are conducive to societal well-being. (Displacing local communities for engineering endeavours cannot be understood as agency.)
- Go the extra mile to make social justice and sustainable development a vehicle for the well-being of future generations.
- Take ownership of their responsibility as agents who want to achieve those goals.

The example provided previously (financial constraints imposed on engineering) illustrates a situation where limits to agency freedom get in the way of agency achievement.

As such, the CA proposes that the outcomes of well-being or development be conceptualised, amongst other things, in terms of people's effective opportunities to undertake the action, be whom they want to be or achieve desired goals.²⁴ To evaluate the professional capabilities of engineers, we might therefore ask questions such as, 'What effective opportunities exist for engineers to design, create and implement engineering solutions that advance sustainable development?'

In its account of human diversity in the evaluation of well-being, the CA acknowledges the role of contextual factors that influence how a person can be, or is free to convert the characteristics of goods or services into a function.²⁵ These elements are defined as 'conversion factors', which can take the form of personal (internal to the individual person), social (the society in which one lives), and environmental (emerging from the physical environment in which one lives) forces at work.²⁶ Applied to engineering, funding constraints can be seen as social conversion factors that get in the way of the engineer's freedom to convert engineering knowledge into sustainable engineering solutions.

As such, the CA can be described as a wide-ranging normative framework that can be used: narrowly to tell us what information we should look at if we are to judge how well someone's life is going or has gone; and broadly as an evaluative framework within which to conceptualise, measure and evaluate well-being.²⁷ In other words, the CA can be used to tell us what information we should look at if we are to judge how well engineering functionings are going or to evaluate and measure professional engineering capabilities. By so doing, it can help to conceptualise 'professional engineering well-being'. This can serve as a basis upon which to identify educational capabilities and functionings that are necessary to develop engineers who use their agency to secure their own well-being, while at the same time enhancing effective opportunities for all people.

SUSTAINABLE DEVELOPMENT

The most popular definition of sustainable development is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.²⁸ Although this definition, which was formulated by the World Commission on Environment and Development (WCED) is often criticised for being too vague, it still remains useful in shaping our thinking about what we might want development to look like in the long run. Firstly, it adds a time dimension to the conceptions of development, prompting us to question how long development can last and still be considered as a manifestation of positive change in society if it looks the way it does. Secondly, there are two key concepts contained in this definition:

- The concept of needs, especially the basic or essential needs of the world's poor, to which priority should be given.
- The concept of limitations, particularly the restrictions imposed on the natural environment's ability to absorb the effects of human activity or renew resources, due to the state of technology and social organisation.²⁹

Thus conceived, we cannot take it for granted that development efforts have a positive effect on, or improve the lives of human beings, if they neglect the needs of the poor or limit opportunities for the environment to renew itself so that it can cater for the future needs of both human and non-human life. As such, anyone driven by either long-term self-interest, concern for poverty, or concern for inter-generational equity would arguably be willing to support the operational objectives that stem from the WCED's definition of sustainable development.³⁰ Such a broad definition of sustainable development lends itself to consensus because it is founded on scientific evidence on environmental degradation, moral and ethical principles about poverty, and considerations for long-term self-interest.³¹ Therefore, theoretically, this formulation of sustainable development has the potential for building a broad and powerful consensus.³² An indication of the

resonance this definition has in shaping mainstream understandings of sustainability is reflected by its widespread use and frequency of citation.³³ Much of the early literature on sustainable development focused on the economic dimension, placing emphasis on the need to maintain productivity levels in industry and wealth in parts of the world where it had been achieved, or providing employment and increasing economic participation for the world's poor. Over time, the social dimension of sustainability has received increased attention, with more emphasis placed on values and goals such as increased life expectancy, education for all, and equity.³⁴ In the last five decades, a number of key international milestones signified the increased recognition of sustainability as an important component in development strategies. These include the following:

- 1972 UN Conference on the Human Environment;
- 1992 UN Conference on Environment and Development (UNCED) or 'Earth Summit' (where Agenda 21 was agreed upon as a blueprint for sustainable development, which reflects global consensus and political commitment to integrate environmental concerns into social and economic decision-making processes);
- 2000 UN Millennium Summit (where the Millennium Development Goals (MDGs) were adopted; these included eight antipoverty targets to be accomplished by 2015);
- 2002 World Summit on Sustainable Development (WSSD) (where commitments to sustainable development were reaffirmed alongside the notion of development that aims for equity within and between generations, and poverty eradication being placed at the centre of sustainability measures); and
- 2015 UN Sustainable Development Summit (where world leaders adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 SDGs to end poverty, fight inequality and injustice, and tackle climate change by 2030).³⁵

According to the UN's Global Sustainable Development Report, much progress has been made on the MDGs, showing the value of a unifying agenda that is underpinned by goals and targets. While the MDGs aimed at an array of issues (including reducing poverty, hunger, disease and gender inequality by 2015), the new SDGs and the broader sustainability agenda seek to go further than the MDGs, in order to address the root causes of poverty and the universal need for development that works for all people.³⁶ Drawing from Goal 1 of the SDGs (i.e. to end poverty in all its forms everywhere), if engineering is for sustainable development, engineering outcomes should benefit all of humanity and ultimately eradicate poverty. In order to interrogate the relevance and importance of this normative critique of engineering outcomes, empirical data (consisting of global North and global South perspectives) was gathered from professional engineers, engineering lecturers, and students from Germany and South Africa.

DATA AND METHODOLOGY

Qualitative research methods were used to gather thick descriptions, which are not aimed at comparing or generalising findings for the sake of 'borrowing' policy and practice, but rather to help broaden our understanding of what it means to be an engineer in the modern world, and where the notion of sustainable development fits into engineering practice. Moreover, a CA lens on this data widens the range of research questions that can be addressed in engineering education research, thereby creating opportunities to expand current engineering education methodologies.³⁷

The data employed in this chapter stems from 20 semi-structured interviews and 4 focus group discussions that were conducted between July 2013 and September 2014. In total, perspectives were gathered from: 18 engineering students, 10 lecturers from Universität Bremen (Germany) and the University of Cape Town (South Africa), and 10 engineering employers from both countries (N total = 38). Purposive sampling was used to select the research participants and higher education institutions.³⁸ For purposes of this global South-global North inquiry, one South African and one German university were selected based on 'best case' criteria. That is, the universities from which students and lecturers were recruited had to have exemplary engineering curricula in terms of addressing sustainable development and/or infusing the humanities in their curricula and pedagogies. Having downloaded recent engineering faculty yearbooks and module catalogues from various university websites, I conducted a simple document analysis by searching through them using key words such as 'sustainability' 'sustainable development' 'environment' 'society' and 'communication'. The decision to shortlist universities in this way was fuelled by the idea that it would be more valuable to explore what is already being done at universities to promote sustainable development and to reflect on how this influences engineers' attitude towards, and understandings of, the concept.

In selecting each of the case sites, I: considered the reputations of each institutions' engineering department in relation to the commitment to sustainable development; looked at the course descriptions provided in recent handbooks and yearbooks; and conducted a secondary search using broader search phrases like 'environmental impact assessment' and 'lifecycle assessment'. The electronic databases available on university websites therefore made it possible to identify the university's explicit commitments to promoting education for sustainable development within the engineering programmes.

In order to select appropriate participants for the study, I developed a set of criteria to ensure that I would gather the perspectives of students and lecturers whose experiences with engineering education, and employers whose experiences of engineering practice were relevant in terms of the objectives of the study. When selecting employers, I sought professional engineers with extensive work experience in any engineering field, who have worked with or led engineering teams. It was also important to select a diverse group of people in terms of gender, as I was interested in the voices of women (who are under-represented in the engineering profession). Another selection criterion was employment

in companies that explicitly endorse engineering practices that promote energy efficiency, are involved in renewable energy or community development programmes as part of their corporate social responsibility duties, or as reflections of their support of initiatives that are pro-sustainable development. Using existing contacts with a few qualified engineers, I was able to snowball further suggestions for potential interviewees. Ultimately, I was able to recruit 10 employers from across seven medium to large engineering companies that operate in diverse fields in Germany and South Africa (a summary of company profiles are listed in Table 6.1).

With regard to selecting students and lecturers, similar criteria applied to both universities. Students had to be enrolled for a master’s degree in an engineering programme that substantially engages with sustainable development in its curriculum. Master’s students were targeted instead of undergraduate students because they have more educational experience. This means that they are likely to have a wider range of experiences within engineering education from which to draw and formulate their perceptions of how their education has shaped their capabilities and attitudes towards conceptions of development over time.

Table 6.1: Company profiles

Company	Main areas of business
<i>In Germany</i>	
MT Energie	Biogas technology and renewable energies
MT Biomethan	Biogas upgrading technology and natural gas purification
EWE NETZ	Energy, telecommunications and information technology
ProcessQ	Consulting
<i>In South Africa</i>	
Sasol Limited	Energy, chemicals, fuels; coal-to-/gas-to- liquid processing
STEAG Energy	Energy and power plant operations
Group 5 Limited	Construction, manufacturing and infrastructure development

Source: Author³⁹

In Germany, I was ultimately able to recruit seven students from Universität Bremen. In South Africa, I recruited 11 students from the University of Cape Town (Table 6.2).

With regard to the lecturers, 10 were recruited: eight being from the selected case sites (four from the University of Cape Town, four from Universität Bremen); and two from other universities (one from Stellenbosch University and one from the Technical University of Clausthal).

Table 6.2: Engineering programmes from which students were recruited

Study programme	University	No. of students
<i>Germany</i>		
MSc. Industrial Engineering	Universität Bremen	2
MSc. Production Engineering	Universität Bremen	1
MSc. Process Engineering	Universität Bremen	4
<i>South Africa</i>		
MSc. Chemical Engineering	University of Cape Town	11

Source: Author⁴⁰

It is important to keep in mind that the purpose of this study was not a comparison of views held by specific universities, but rather an attempt to gather perspectives from people whose teaching and learning in the engineering field has taken place in Germany or South Africa. The selected institutions were chosen because of the probability that they would provide the most appropriate sample of students and lecturers whose views can help answer the research questions, not because views from lecturers who are not employed by the University of Cape Town or Universität Bremen cannot contribute to this end. For these reasons, I decided to keep the two 'outside' lecturers in the sample. In total, I recruited 10 lecturers (five from Germany and five from South Africa) across six engineering faculties (Table 6.3).

Table 6.3: Faculties from which lecturers were recruited

Faculty	University	No. of lecturers
<i>Germany</i>		
Applied Mechanics	T. Universität Clausthal	1
Process Engineering	Universität Bremen	2
Physics and Electrical Engineering	Universität Bremen	1
Production Engineering	Universität Bremen	1
<i>South Africa</i>		
Chemistry and Polymer Science	Stellenbosch University	1
Engineering and the Built Environment	University of Cape Town	4

Source: Author⁴¹

Each group of participants in this study represents different angles from which the field of engineering and its teaching and learning can be viewed. Interviews were first conducted with engineering employers/professional engineers (Table 6.1) to explore what technical skills and so-called soft skills are most valued by individuals who represent the industry. Also discussed in the interviews was how the selected employers perceive the role of engineers in advancing sustainable development through their work. All but two of the professional engineers interviewed were male, between the ages of 40 and 60, had engineering qualifications or natural sciences educational backgrounds, and had

considerable experience (on average 18 years) of working in engineering firms or with engineers and engineering teams. Both female interviewees are from the South African sample of employers, with one holding a social sciences qualification. Their individual profiles are provided below, and pseudonyms are used to protect interviewee identities.

ENGINEERING EMPLOYERS

GERMAN EMPLOYERS

1. *Matthias Klemp* holds a master's degree in physics and is a technical director at MT Energie, a private company that focuses on the production of electricity from renewable sources.
2. *Sebastian Braun* has a background in mechanical engineering, economics and mass production. He currently works as a project manager in industrial projects related to process technologies for MT Energie. In 1997, he founded an engineering firm in Austria (his home country), which deals particularly with mechanical engineering project management, offering site supervision and consulting services.
3. *Thore Lehman* is a qualified process engineer. He works as a technical director at MT Biomethan (a subsidiary of MT Energie) with engineering teams involved in the construction of biogas power plants and is in charge of the technology, production and quality management divisions.
4. *Theodor Klein* has a background in mechanical and production engineering, with specialisation in process engineering. He also holds a PhD in process engineering and currently works as a project manager for EWE Netz.
5. *Rolf Weiss* is qualified in the field of energy and process engineering. He holds a PhD in process engineering, and was previously employed as a quality, operations and logistics manager. In 2008, he founded his own company, ProcessQ, which offers consultation services to small and medium sized companies, with a focus on organisational development and quality management.

SOUTH AFRICAN EMPLOYERS

1. *Claire White* is a chemical engineer by training, who spent her early career years working in engineering production, and moved into control engineering before getting involved with the recruitment, training and development of young graduate engineers at Sasol.
2. *Pravesh Kumar* is a senior project engineer at Sasol Technology, with an electrical engineering background. He has been involved in plant maintenance and leading projects at power stations at Sasol Oil and Sasol Technology for over 20 years.

3. *David Schrader* is the managing director of STEAG Energy Services South Africa, with a background in process engineering. Of German descent, he earned his qualification through a combination of vocational training and engineering studies at a technical university in Germany. He has 20 years work experience (mostly in South Africa).
4. *Paul Chambers*, who holds a BSc in civil engineering and a Master of Business Leadership (MBL), is an engineering director within the engineering and construction cluster of Group 5, one of the largest construction companies in South Africa. The sectors in which the company operates include road, power, oil and gas, as well as housing and transportation.
5. *Cindy Shaw* (the only non-engineer amongst the interviewees) holds an MBA in organisational learning and a doctorate in organisational behaviour. She is mostly involved with management and leadership development and heads the graduate recruitment, selection and development unit of Group Five's engineering bursary division.

The interviews with lecturers (Table 6.4) were aimed at gaining perspectives from the respective engineering departments at the selected universities on teaching and learning in engineering, the value of engineering education, as well as their views on its relation to sustainable development.

Table 6.4: Employer profiles

Interviewee	Company	Qualification/background
<i>From Germany</i>		
Matthias Klemp	MT Energie	MSc Physics
Sebastian Braun	MT Energie	Mechanical Engineer
Thore Lehman	MT Biomethan	Process and Industrial Engineering
Theodor Klein	EWE NETZ	PhD Process Engineering
Rolf Weiss	ProcessQ	PhD Process Engineering
<i>From South Africa</i>		
Claire White	Sasol	Chemical Engineer
Pravesh Kumar	Sasol	Electrical Engineer
David Schrader	STEAG Energy	Process Engineer
Paul Chambers	Group Five	Civil Engineer
Cindy Shaw	Group Five	PhD Organisational Behaviour
Total: 10 (8 male; 2 female)		

Source: Author⁴²

At the time of the interviews, most interviewees were senior lecturers in the Faculty of Production Engineering at the Universität Bremen or the Faculty of Engineering and the Built Environment at the University of Cape Town. As the following individual profile summaries show, all interviewees also serve/served as head of an engineering department or research group at their respective universities.

LECTURERS

GERMAN LECTURERS

1. *Prof (em) Dr Ing Jan Bremer* is an Honorary Professor of Applied Mechanics. His career in teaching and research spans institutions such as the University of Karlsruhe, the Technical University of Berlin and the Technical University of Clausthal, where he taught in the areas of Fluid Mechanics, Thermodynamics, Systems Engineering and Technology Assessment.
2. *Prof Dr Ing Andreas Kleid* heads the Department for Integrated Product Development at the Faculty of Production Engineering at the Universität Bremen. He offers various courses, including Introduction to Engineering Design, Applying and Comparing Creativity Techniques, Computer-aided Design (CAD) Management and Virtual Product Development as well as Production Systems.
3. *Prof Dr Ing Antonio Marco* is the Dean at the Faculty of Production Engineering at the Universität Bremen and heads the Hybrid Materials Interfaces (HMI) Research Group within the Department of Process Engineering. The courses he teaches include Foundation of Materials Sciences, Photovoltaics, and Biology for Engineers.
4. *Prof Dr Jonas Schneider* is an Honorary Professor who leads the Vocational Education and Training Research Group at the Faculty of Physics and Electrical Engineering at the Universität Bremen. An expert in the field of vocational training research, his current projects include extensive comparative education research involving countries like Germany and South Africa.
5. *Prof Dr Ing Maria Schwartz* is a Director of the Bremen Institute for Mechanical Engineering, within the Faculty of Production Engineering at the Universität Bremen. Heading the department of Design and Process Technology, she teaches courses such as Assembly Technology and Systems, Process Planning and Assembly Logistics.

SOUTH AFRICAN LECTURERS

1. *Prof Chad Block* is an Associate Professor at the Faculty of Engineering and the Built Environment in the Department of Chemical Engineering at the University of

Cape Town. He is a Senior Lecturer in Chemical Engineering and Head of Research in Environmental and Process Systems Engineering.

2. *Prof Emily Grant* is a Senior Lecturer at the Faculty of Science in the Department of Chemistry and Polymer Science at the University of Stellenbosch. She runs a multi-disciplinary research group with interests in Medicinal Chemistry, Chemical Education and the Philosophy of Science, Education and Chemistry.
3. *Prof (em) Bradley Hunter* served as Head of the Department of Chemical Engineering, Dean of the Faculty of Engineering and the Built Environment as well as Acting Deputy Vice-Chancellor at the University of Cape Town before his retirement in 2009.
4. *Dr Stephen Jones* of the Faculty of Engineering and the Built Environment at the Department of Chemical Engineering at the University of Cape Town is Director of the Centre for Catalysis Research.
5. *Prof Carol Smith* is from the Faculty of Engineering and the Built Environment at the Department of Chemical Engineering at the University of Cape Town. She teaches chemistry to undergraduate engineering students. She is also a student advisor to first-year chemical engineering students.

Table 6.5: Lecturers' profiles

Interviewees	Faculty/department	University
From Germany		
Prof (em) Dr Ing Jan Bremer	Applied Mechanics	Technische Universität Clausthal
Prof Dr Ing Andreas Kleid	Production Engineering	Universität Bremen
Prof Dr Ing Antonio Marco	Production Engineering	Universität Bremen
Prof Dr Jonas Schneider	Physics & Electrical Engineering	Universität Bremen
Prof Dr Ing Maria Schwartz	Production Engineering	Universität Bremen
From South Africa		
Prof Chad Block	Engineering & the Built Environment	University of Cape Town
Prof Emily Grant	Chemistry & Polymer Science	Stellenbosch University
Prof (em) Bradley Hunter	Engineering & the Built Environment	University of Cape Town
Dr Stephen Jones	Engineering & the Built Environment	University of Cape Town
Prof Carol Smith	Engineering & the Built Environment	University of Cape Town
Total: 10 (7 male; 3 female)		

Source: Author⁴³

STUDENTS

The focus group discussions with students (Table 6.6) were geared towards gathering students' voices on their university learning experiences, what they value about engineering

education, how they identify with the profession and their views on this in relation to sustainable development. All interviews and focus group discussions were audio recorded with a portable electronic voice recorder, and I manually transcribed verbatim for the purpose of analysis, using the Olympus Dictation Management System. All German responses were directly translated by and cross-checked by a German native speaker for inaccuracies. At the time that data was collected, the students from the University of Cape Town were enrolled in their first or second year of a master's programme in Chemical Engineering. Of the 11 participants, seven were Zimbabwean and only four were South African. Although the selected students from the University of Cape Town have different nationalities, both Zimbabwean and South African views offer global South perspectives and all the students' undergraduate and post-graduate engineering studies took place at the same university.

Table 6.6: Students' profiles

Student	Study programme	University	Nationality
<i>Focus group 1</i>			
Anna	MSc Industrial Engineering	Universität Bremen	German
Lisa	MSc Industrial Engineering	Universität Bremen	German
Phillip	MSc Production Engineering	Universität Bremen	German
<i>Focus group 2</i>			
Arnold	MSc Process Engineering	Universität Bremen	German
Kurt	MSc Process Engineering	Universität Bremen	German
Markus	MSc Process Engineering	Universität Bremen	German
Rupert	MSc Process Engineering	Universität Bremen	German
<i>Focus group 3</i>			
Damon	MSc Chemical Engineering	University of Cape Town	Zimbabwean
Jennifer	MSc Chemical Engineering	University of Cape Town	Zimbabwean
Sandra	MSc Chemical Engineering	University of Cape Town	Zimbabwean
Wendy	MSc Chemical Engineering	University of Cape Town	Zimbabwean
<i>Focus group 4</i>			
Christina	MSc Chemical Engineering	University of Cape Town	Zimbabwean
Justin	MSc Chemical Engineering	University of Cape Town	South African
Molly	MSc Chemical Engineering	University of Cape Town	South African
Penelope	MSc Chemical Engineering	University of Cape Town	Zimbabwean
Peter	MSc Chemical Engineering	University of Cape Town	South African
Valerie	MSc Chemical Engineering	University of Cape Town	South African
<i>Interview 1</i>			
Trevor	MSc Chemical Engineering	University of Cape Town	Zimbabwean

Total: 18 students; 4 focus groups

Source: Author⁴⁴

The students from Universität Bremen were enrolled in their first or second year of a master's degree in either Industrial-, Production-, or Process Engineering; all are German nationals. The four stages in the cycle of analysis that are consistent with grounded theory and that were applied to the transcripts are coding, conceptualising, categorising and theorising.⁴⁵ The systematic procedure I followed in analysing the interviews and focus group transcripts was as follows:

- i. Coding, which entails reviewing the transcripts sentence by sentence to identify anchors (words or phrases) that allow the key points of the data to surface;
- ii. Conceptualising, which means grouping codes with similar content (where new concepts are core parameters of the data and codes can be seen as dimensions of these concepts);
- iii. Categorising, which is about developing categories that group concepts broadly and constitute the basic elements to be generated into a hypothesis or theory; and
- iv. Theorising, which is the process of constructing a system of explanations for the main concerns of the subject of the research.

Results presented in this chapter, and discussed in the next sections, are a selection of the findings drawn from sections in the transcripts where 'sustainability' and 'development' emerged as themes during the analysis procedure.

CRITICAL REFLECTIONS ON ENGINEERING FOR SUSTAINABLE DEVELOPMENT

This discussion of the results draws substantially on the voices of the study participants. The discussion juxtaposes summaries of the interpretation of the data with the actual utterances of the study participants. For orientation purposes, all the excerpts from the interview transcripts are denoted 'ZIM', for Zimbabwe, 'SA' for South Africa and 'GER' for Germany.

'ENGINEERS CAN BE PART OF THE SOLUTION': EMPLOYERS' PERSPECTIVES

There is general agreement amongst the employers interviewed that the work engineers do contributes to positive change and valuable benefits to society, as well as sustainable development. However, there are mixed views on the effective power of engineers to be drivers of this change.

Rolf Weiss (GER) shares his wide-ranging view on the inter-relations between engineering and human development, reflecting on the fact that a joint and collaborative movement towards sustainable well-being requires the participation of stakeholders at the economic, political, societal and individual level. He argues that engineers play an important role in advancing sustainable development, but acknowledges that this is not unique to the engineering profession. He also elaborates on this view by adding that the results of the work engineers do in relation to technological advancement are often the starting point to instigate sustainable development efforts:

Engineers can be part of the solution. Because there are questions of power supply, water supply, the fundamental problems that when you look at things globally, the human race has- [is] of course dependent on good technical solutions. That on its own is not enough, because it needs political conditions, it needs financing, and so forth; but new technical solutions could be the initiators to ensure that solutions are found and insofar, it is a very fundamental and important role that engineers play, especially for such questions as sustainable development ... and the challenges are many.

Matthias Klemp (GER) is less keen to say that engineers have effective power. His words show a more critical stance to this assumption; for example, he talks about the role industry plays in dictating engineering activities, saying that some companies, including engineering firms, only support pro-sustainability initiatives as a front and that

They make little projects for advertisement to show that they are 'green', but finally what they would like to do - they would like to earn money and they don't care (about sustainability).

His depiction of engineers gives the impression that they are more responsive to the demands of industry, rather than them being initiators of positive social change. His views on the role of engineers in promoting sustainable development agendas are also not enthusiastic; he posits that the influential power of engineers is limited, stating:

Engineers have influence, of course. But I think one should not over-estimate this influence. Politics has much more influence.

He concludes by stating, 'Engineers do not change the world, basically.'

Matthias Klemp's (GER) opinion is particularly sceptical, and elements of his statements are supported by the views of other employers. In contrast, Sebastian Braun's (GER) view is more balanced. He affirms that decisions made by engineers in judging the feasibility of construction projects are indicative of their strong position in society and in matters of development. He also speaks broadly about all types of employment being linked to human development:

What everybody is doing for his living, I think, is about the increase of life quality ... if you are aware of this, I think you become aware that it's not so much about quantity or increased quantities, it's about increasing of quality [of life]. And for the engineers, the relevance is that during a feasibility phase of projects ... it very much depends on the engineers. They, in most cases, make the decisions on whether a project is going to be realised or not, and it's a big responsibility.

Claire White (SA) expresses concern that engineering graduates believe the only way in which they can contribute meaningfully to sustainable development is by being employed in companies that are in the renewable energy sector. She stresses that during her selection interviews, she brings it to the attention of the individuals being recruited that they ought to look at other avenues to make a meaningful contribution to society through their work, regardless of the engineering discipline or field:

We have a lot of engineers who say they want to get into environmental engineering and I kind of tell them that every engineer should be thinking about environmental or sustainable development, whatever you do, every project, any way you run a plant ... it's your responsibility.

Paul Chambers (SA) provides an example of how engineers can design effective solutions to societal challenges in a manner that improves the infrastructure in a particular community, but also equips community members with useful skills. Through this, he alludes to community capability expansion through public-good engineering, where the results of engineering efforts (for example, designing a dam) result in creating valuable capabilities, for example, skills that enhance capability for employment. In his example, he discusses a construction project where the engineering team that designed the dam specifically aimed to ensure that it would require community involvement. This is also a good example of what one might refer to as a participatory approach to development aid:

What the engineers are doing is that they're designing a dam so it can be built by eight hundred people. And those eight hundred people are learning skills and hopefully those skills will be used to build other dams; maybe not a dam as big as this one, because it's quite a labour-intensive construction project, but build maybe other farm dams, and that skill then gets kept. Whereas traditionally, it's been like we go somewhere, we go build something, and come back ... [B]ut now it's more about the sustainability of that community as well, which is quite cool.

To summarise, the views expressed in the interviews suggest that engineers do indeed have the power to influence decisions on projects that are geared towards conceptualising and implementing effective and efficient solutions to a variety of human development challenges. However, some responses suggest that the true authority in this matter lies

at the corporate level, where *homo economicus* principles guide business activities to prioritise exclusive economic profit over inclusive and sustainable development.

'THE QUESTION, "WHAT IS SUSTAINABILITY?" IS NOT REALLY ANSWERED' – LECTURERS' PERSPECTIVE

The discussion in this section shows how some lecturers perceive complex interactions between societal forces that fuel uncertainty regarding the meaning of 'sustainability', and therefore 'sustainable development', which creates difficulty in teaching the concept as a fixed ideal. In one of her responses, Prof Schwartz (GER) suggests there is a lack of consensus about the meaning of sustainability, because our moral judgment about what sustainable development is varies, depending on a number of complex variables. The questions Prof Schwarz poses are good examples of the kind of questions engineering students should be grappling with in order to exercise critical thinking on notions of sustainable development. She asks:

What is sustainability? What does that mean? Does that mean that we do not use any energy anymore to keep the planet stable? Do we all want that? Does that mean that we do not produce any garbage anymore? The question, 'What is sustainability?', is not really answered right now.

She goes on to give some examples of what could be considered sustainable practices in agriculture, manufacturing and design, in each case highlighting the difficulty in labelling something as a sustainable process. She uses the example that arable land is being used for growing crops that are used in biofuel, instead of growing crops for human consumption. She argues:

We are using bioenergy, and killing places where food could grow ... the question is very difficult to answer, 'What is sustainability?'

Prof Schwarz's responses show that she believes sustainable development is a multifaceted and fluid concept. This implies that she would rather teach her students to think critically about approaches to sustainable solutions, than promote the idea that one particular solution is necessarily more sustainable or beneficial to society than another. On the other hand, in defining sustainability or teaching what sustainable development means, Prof Smith (SA) explains how chemical engineering might lend itself to exploring ways in which the environmental dimension of sustainability can be addressed through teaching aspects of cleaner production or waste management systems. She does note, however, that it is very difficult to engage students deeply on the broader dimension of sustainable development that is concerned with societal issues:

... at the post graduate level, they use life cycle analysis and so on, so very much a chemical/ process engineering kind of take on the notion of cleaner production. So we're not debating so much the issue of social inequity, which is a part of the broader definition. Given [that], the kind of discipline here (chemical engineering) is less an area for serious engagement in that sort of thing, you know, as compared to your course in sociology.

In contrast, Prof Jones (SA) is of the opinion that engineering students come to the university with the necessary sustainability awareness and values in place, arguing that although specific ethical values may be difficult to instil through teaching technical courses, it is something towards which universities should strive. He explains that, in his experience, students come to the university and enrol in engineering programmes with the bold intention of helping to 'save the world' through sustainable engineering outcomes, saying that such ambitions are:

... kind of simplistic [naïve] ... but the value is there; you now just have to build that value and bring more sophisticated understanding that we're not 'saving the planet' - that will take care of itself. We're saving humanity - that's more of the challenge here. So you can take that good intent all the way through your technical work.

Correspondingly, Prof Schwartz (GER) emphasises the need for engineering students to be cognisant of the fact that technological advancements in themselves are not necessarily pro-human-well-being or sustainable development. However, she emphasises that one cannot look at technology as a bad thing per se. Instead, she argues that the state and society are stakeholders who should be making decisions on some fundamental questions about the pursuit of development through technology. She says:

When people say, 'Technology is bad', I say, 'Okay. How is your life today? How is your medical supply? What is your dentist doing? It's engineering. Yeah? Why do we grow so old? How come so many children survive the first three months, even those with heart diseases. What do you think of the machines that keep them alive during the operation?'

Prof Schwartz (GER) poses these questions to illustrate the good that comes from technological advancements in engineering. The questions also illustrate dilemmas around engineering practice. Her words also serve as a reminder that technological advancement is not necessarily synonymous with development.

To summarise, there are two schools of thought on this subject among the lecturers who informed this research. One school of thought shows confidence in the current engineering curricula as being adequate for addressing sustainable development concerns. The second school calls for more interdisciplinary engagement with the subject and the need to prompt students to think critically about the meaning of sustainability. This difference in the views of lecturers is important to note, because it shows that engineering

educators have different value sets that underlie their conception of teaching sustainable development and its links to the various engineering disciplines. It is apparent that teaching sustainable development comes with the challenge that the concept itself is multifaceted and fluid, making it a difficult subject to teach across the various engineering disciplines.

'WE THINK WE'RE HELPING, BUT ARE WE REALLY?' – STUDENTS' PERSPECTIVE

Students' views on their role in society as future engineers suggest that they are sceptical about their effective power to function as agents of sustainable development. There is a concern about limitations imposed on engineers by industry. Students fear that the prioritisation of the economic dimension of development in the engineering sector will hinder their ability to reach the ideals of sustainable development. For example, Markus (GER) states:

We haven't been in industry and I think it's different there, because it's much more about money than about idealistic thinking.

On the other hand, Kurt (GER) believes that engineers' knowledge and skills give them effective power to influence decision makers in industry in ways that can gear more effort towards sustainable development. He argues that this is more likely to be the case if more engineers end up in managerial positions in the corporate sphere, stating:

Because you have a technical background and you can explain and see the possibilities; and if you talk to the decision maker then you can influence whatever is planned. And I think, in the industry ... the powerful people sometimes are engineers.

On the contrary, Lisa (GER) has apprehensions about the limitations imposed on engineers to exercise their agency in large corporations. She argues that it is easier for engineers to advance sustainable development values in small to medium sized enterprises or companies that explicitly focus on environmental sustainability:

I would rather work in a small to medium sized company, where you can actually influence something, and where it's about making people's lives easier through sustainable development and so on, but also to unburden the environment ... maybe renewable energies, maybe electric cars or that kind of thing.

Kurt (GER) also sees this issue in the same way, but emphasises that the problem lies in too many decisions related to sustainable development having a political dimension. His words describe engineers as pioneers of change, where the mandate of that change is predetermined by the state:

I think a lot of it is more from the politics, but the engineers are the people who, if politics says there is a power plant and we have to reduce the CO₂, then the engineer has to think about how to do it. So the engineers are the people who are trying to reach what politics has decided.

While Arnold (GER) expressed similar sentiments, he added that *homo economicus* principles are over-emphasised in industry. He argues that this is the reason why engineers do not have the voice they should. He says:

... you would have to convince the people who earn a lot of money with their company, and if that income is decreased, it's really hard to convince someone to do research into renewable energies. I think they [politicians] don't even know what is the potential of engineers' techniques - what is possible, what is not. And so I think there is an influence, but, as I said before, as long as society and politics don't want to change the way we live, it won't really be possible.

Again, the intricacy of various aspects involved in determining who gets to decide on the pursuit of sustainable development agendas is highlighted. Rupert (GER) explains the cyclic result of engineers being 'fixers' of what industry identifies as problems, asserting that the very effort engineers have geared towards development in the past has contributed to current challenges:

... many problems we are facing today are at least influenced by engineers. Maybe they didn't know better; maybe they were not as open-minded as we are now. But carbon emission [is] often produced by industries and industries are operated by engineers. So sometimes I think we have to solve problems other engineers initiated before us.

Rupert's assertions sparked a debate among the students concerning accountability for creating technologies, processes and products that have, in the long run, not benefited humanity in a just way:

Markus: Yeah, I would say it's more the company itself not the engineer, I don't know ...

Rupert: Yeah, maybe it wasn't the intention but ...

Arnold: But normally engineers are not the people who make the decisions ...

The perception that 'engineers are not the people who make the decisions' is echoed by most students. Wendy (ZIM) explains:

I think the power is really not in our hands, because it all boils down to the economic aspects. If the company says, 'We have a budget of this much', you have to work within that budget, or else ... I guess you lose your job.

Wendy's statement reflects some fears about the perceived potential consequences of not conforming to company demands, irrespective of their impact on the quest for sustainable development. However, engineers are not simply employees, whose only social responsibility is to obey hierarchy. In extreme cases, blowing the whistle and showing a lack of loyalty to their employers may be necessary.⁴⁶ In other situations, exercising agency for positive change will require engineers to contribute to improving the structures in which they act, in order to turn them into more fair and responsible institutions.⁴⁷

Unlike Wendy (ZIM), Jennifer's (ZIM) opinion advances the notion that engineers remain a powerful professional group in contributing to human well-being, sustainable development and social justice. She argues that engineers have the responsibility to help strike a balance between all three pillars of sustainable development (economy, environment and society):

I think we have the power in our hands to determine the outcome of every process - so whenever we're going to design something, we can still design something that has a lot of economic benefit, but also has advantages to the society; because, in the end, it's [not good] for us to have all this benefit for the elite and then ignore the rest of the people ...

On the other hand, Christina (ZIM) questions the ability of engineers to help 'strike a balance' between the three pillars of sustainable development, again expressing concern about the voice of the engineer not being heard:

But the question is: How effective are you as an individual in that company if you want to have a say in something? Do you have a voice?

Valerie (SA) responds to this question by asking another question, which suggests that engineers necessarily have to come up with solutions within conditions that are characterised by constraints:

Isn't that the challenge for an engineer? To come up with creative solutions in a space where you are limited?

Most focus group participants responded by suggesting that the spaces that exist for graduate engineers in industry are not wide enough to allow meaningful engagement with corporate heads or to allow their voices to be heard. Penelope (ZIM) argues that:

If you're a graduate process engineer at Sasol, you will do what they are doing at Sasol ... [if] you have a good idea to reduce emissions by this amount, but they [Sasol] would rather get a management consultancy firm to transfer the accountability and get them to do the ground work. So the question is: How much say do you have as an engineer within that company to try and change, [things] you know? I don't think we have that much leverage.

Some students argue that engineers can make incremental changes in the way that they carry out their day-to-day work activities, but the overriding sentiment of students' is summarised well in Peter's (SA) words:

In most cases, financial wise, you can try and improve the process in terms of emissions and all that, but in most cases, if it's financially better off and within the regulations of the government, that's [all that matters].

CONCLUSION

Transferring the benefits of technology to society is not a straightforward task. When engineers view technology strictly as a necessary tool for development, attention lies in supplying technological assets or services by focusing only on technology, instead of concentrating on people.⁴⁸ Such approaches to development and development aid projects diminish the potential for social transformation through engineering and technology.⁴⁹ It is therefore important that we see technological development projects, not only as a means to provide an asset or a service, but also as a tool for helping people to shape their own lives and for reducing inequalities.⁵⁰ This view on technological development projects requires professional groups that are at the forefront of development efforts to embrace values associated with social justice. If such values do not underpin their professional functioning, they might fail to use their knowledge and skills to enhance human development or to solve sustainability problems in a just way. It is therefore essential that appropriate conceptions of 'development' are held by professional groups who design, produce and implement technologies in society for the purpose of human progress. This is important, particularly for professional groups like engineers, because their understanding of development determines how they identify or recognise it, as well as how they measure it.

Lecturers' perspectives on teaching sustainable development or sustainability principles, and students' understandings of these concepts imply that engineers' judgments of sustainable engineering practices vary according to what they know or believe. Efforts to embed sustainable development in engineering education therefore require more attention to engineering pedagogies, the values that lecturers bring with them to the classroom, as well as the values that underpin engineering curricula. In particular, the values that engineering educators bring with them to the classroom need to be explored empirically, especially in relation to their understanding of sustainable development. This could uncover pathways that universities might use to impart appropriate knowledge for future engineers to function as sustainable development agents, by ensuring that engineering pedagogies convey values that are consistent with social justice.

Students clearly value their role as engineers; they seem to take pride in their ability to use their knowledge and skills to solve engineering problems and have the desire to effect positive change. That is, they value engineering functionings, or *being* engineers and *doing* engineering work. In addition, students see engineers as important role players in helping to shape or even initiate positive change in terms of sustainable development. The general logic behind this view is that engineering knowledge is fundamental to any development process and therefore their involvement in development efforts is central. However, the students also expressed doubt about the extent and reach of engineers' effective power as a professional group. This doubt is generally fuelled by the idea that engineers are not the ultimate decision makers in the corporate world, which implies that engineers have limited voice and agency within industry, despite their pivotal knowledge used to advance development. Students' views are that engineers' voices can best be heard in companies that explicitly address sustainable development challenges, or when engineers are in managerial positions in large companies. This shows that the students are able to recognise, discern, and articulate some of the economic and material constraints to engineers' professional freedom and agency, particularly in relation to advancing sustainable development through professional functioning.

The findings thus imply that notions of 'sustainability', and therefore 'sustainable development', need to be periodically reconceptualised to ensure that efforts directed at their achievement remain relevant for diverse human needs. This chapter proposes that a starting point for this redefinition lies in the employment of the CA as a normative and evaluative framework for innovation and engineering outcomes. Through the lens of the CA, if engineering innovations do not result in opportunities for all people to do and to be what they have reason to value, they cannot be considered as being *for* sustainable development. The reflections on engineering for sustainable development presented in this chapter are best summed up in Christina's (ZIM) words, whose statement ends in the question that inspired the title of this chapter:

I've heard often from the older generation [that] chemical engineers are responsible for a lot of degradation right now, a lot of stuff that's gone wrong in the world. So ... we think we're helping, but are we really?

It is therefore clear that too heavy an emphasis on technical expertise, to the exclusion of developing transversal skills like critical thinking, diminishes engineers' professional capabilities. Narrowing engineering education outcomes to technical knowledge limits students' opportunities to establish, show, and improve their knowledge of and commitment to sustainability challenges. Although providing courses on sustainable development in engineering curricula is worthwhile for purposes of teaching students about global environmental challenges, students also need education that enhances their effective freedoms (capabilities) to channel their skills and knowledge explicitly towards solving problems such as extreme poverty. Perhaps, more importantly, engineering education

ought to develop students' interest in becoming socially and politically active public-good engineers, who are not only technical experts, but who are able to think critically and make appropriate decisions about their involvement in creating engineering products that may or may not advance human development.

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PART IV

Natural Resources and Wetlands Management

Timber as a Source of Sustainable Development

A Case Study of Timber Harvesting in Lupane, Zimbabwe

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ABSTRACT

It has long been argued that natural resources are potential drivers of economic development. However, there are concerns regarding the results of natural resources-driven economic development attempts, especially in developing primary commodities-rich countries, which have been disappointing. The disappointments point to a combination of economic and political factors. An additional and prominent factor in this mix is the adverse environmental consequences of unsustainable natural resources exploitation practices. This research examined the economic, environmental and social issues relating to natural resource extraction, through a case study of timber exploitation in Lupane District, located in the northern part of Zimbabwe. The case study employed questionnaires, semi-structured interviews, observation and documentation review to gather data relating to the contribution of timber harvesting to economic and sustainable development. The findings revealed that timber harvesting contributes to economic development in Lupane through resource sharing. This ultimately leads to improved livelihoods through employment creation and infrastructure development (for example, school construction and maintenance). However, the research also revealed some environmental concerns regarding the sustainability of timber extraction, a prominent concern is the issue of non-compliance with contractual obligations by concessionaires, which has, at times, led to the cancellation of the timber exploitation concessions in the district. The study concludes by noting the need for policy and institutional strengthening aimed at addressing the sustainability of timber harvesting.

INTRODUCTION

Natural resources are materials provided by the Earth that humans can use to make more complex products. The resources are special economic goods that have the potential to contribute towards improving human welfare through stimulating economic development and growth.^{1,2} They have played a crucial role in the development of industrial nations like Australia, the United States (US), Canada and the Scandinavian countries. Botswana also has a good track record in pursuing good governance, sustainable growth on the basis of prudent economic management, and sound investment of natural resource revenue.³ The country has managed revenue and rent streams from its main natural resources in ways that have contributed to impressive economic growth since independence in 1966 – and even showing the world's highest recorded rate of growth of gross national product (GNP) per capita from 1965 to 1998, although it slowed down after 1990.⁴

Timber is an important natural resource that, if managed properly, can spur wider economic development but if mismanaged can be disastrous.⁵ Harnessing this resource presents a transformative opportunity for many developing nations, through the creation of linkages into and out of resource exploitation activities.^{6,7} Africa's unique timber resources provide an opportunity for the continent to achieve its envisaged economic growth and development objectives, through the development of sustainable (economically and environmentally) resources-linked manufacturing and services industry clusters. Countries like Botswana and Malaysia have successfully used timber resources in this way.⁸

Globally, timber harvesting has increased by 60 per cent in the last four decades and it will continue to grow in the near future, but at a slower rate.⁹ International trade in forest products has increased at a much faster rate than the increase in production.¹⁰ The global value of timber harvested in 2000 was about US\$400 billion.¹¹ In many countries in Sub-Saharan Africa, forest stocks generate a wide range of timber and non-timber products and services that benefit the population, both directly and indirectly. In Zimbabwe, the country's forest resources cover approximately 66 per cent of the total land area.¹² They contribute significantly to the economy, accounting for an average three per cent of gross domestic product (GDP) and employing eight per cent of the people in the manufacturing sector.¹³ Benefits to local people are more direct in situations where forest land is converted to agricultural land. Zimbabwe's forests include both exotic and indigenous timber forests.¹⁴ For instance, teak woodland is indigenous and exclusive to the Kalahari Sands, which is predominantly found in the demarcated forests of Western Zimbabwe and parts of Hwange National Park. The mopane woodland, is another source of timber for craftwork, good firewood, small household items (including fence posts and hut poles), mine props, railway sleepers and some parquet floors.¹⁶ Unfortunately, Zimbabwe is losing more than 300 000 hectares of forest annually due to deforestation.¹⁵ Woodland cover has been disappearing at a rate of 15-16 per cent in the past three decades.¹⁷ The logging

of transboundary timber is disturbing fragile ecosystems and this is accelerating vulnerability to the adverse impacts of climate change and soil degradation.

Forest management in Zimbabwe is guided by the Forest Act¹⁶ and the Communal Land Forest Produce Act,¹⁷ which are administered by the Forestry Commission. However, the policy is often not enforced effectively, particularly in dealing with illegal timber logging. As a result, the country is losing between US\$2 million and US\$6 million per year through illegal timber exploitation by corrupt individuals, including politicians. More important, and worryingly, the majority of illegal operations in this space often do not follow good practices in harvesting timber in these forests, which is compromising the sustainability of timber harvesting in Zimbabwe.¹⁸

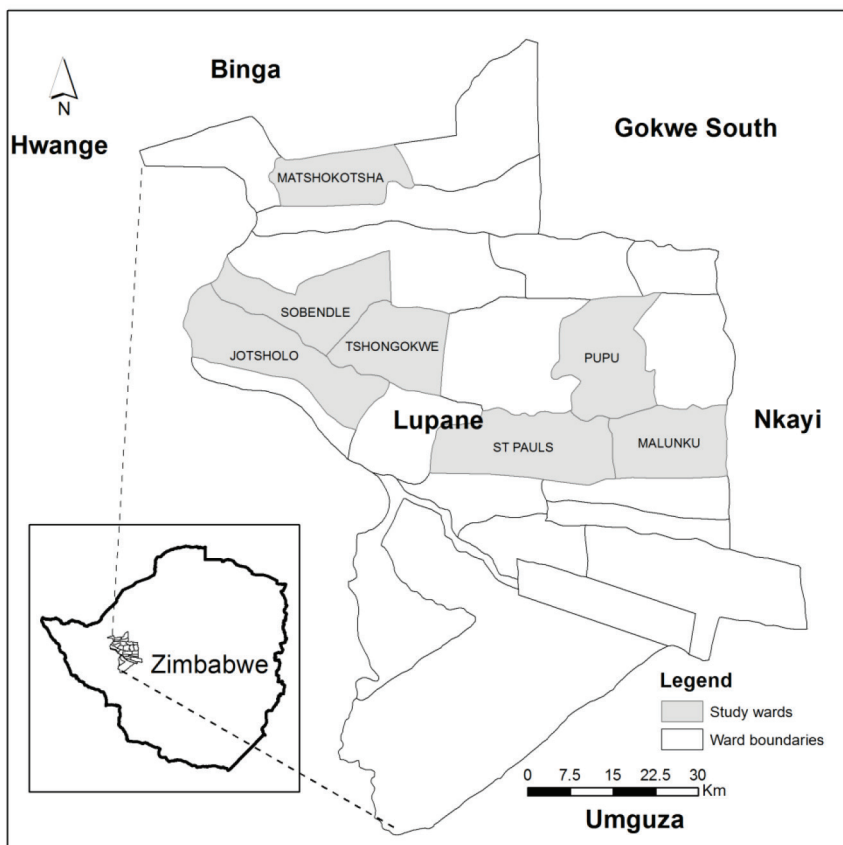
It is against this background that a study was carried out in Lupane, which focused on timber harvesting as a driver of economic development. It sought to achieve three objectives:

- i. to establish the contribution of timber harvesting to economic development in Lupane District;
- ii. to determine how local communities participate in the management of timber as a natural resource; and
- iii. to examine concerns regarding sustainability of timber harvesting in the area.

METHODOLOGY

STUDY AREA

This research was limited to the Lupane District of Zimbabwe. The district is located in the Matebeleland North province of the country, as shown in Figure 7.1. The district falls in Agro-ecological Regions 4 and 5, which are characterised by low annual average rainfall of between 400 and 500 millimeters and high summer temperatures that can soar to 35 degrees Celsius. The district is also characterised by loose Kalahari sands, which are easily leached and therefore of low nutrient fertility.

Figure 7.1: A map of Zimbabwe and the location of the Lupane DistrictSource: Authors¹⁹

The soils contribute to the growth of indigenous hardwood timber forests, including Zambezi teak, mahogany and mukwa. In terms of state forest reserves, Lupane has the second highest coverage in Matabeleland North Province, at 46 per cent. The district is also known for its other natural resource endowments – which include mineral deposits, biodiversity, wildlife and the Zambezi River system.²⁰

RESEARCH DESIGN AND SAMPLING

A case study research design was employed as a means of intensively studying the phenomenon of timber exploitation and its consequences over time within a natural setting. In that regard, the researchers spent considerable time in the district of Lupane, in order to understand the phenomenon being studied. The district has 28 wards and to make the study significant, 21 per cent of the wards were covered using the convenience sampling technique. This is a sampling method that involves drawing representative data by

selecting units of analysis because of availability or easy access.²¹ The advantages of this type of sampling are the availability and the speed with which data can be gathered.²²

DATA COLLECTION

The research data was collected through questionnaires, semi-structured interviews with policy makers and observation of issues relevant to the research. Questionnaires were administered to solicit information from the locals in the study wards in the district. The main focus of the questionnaires was to determine the extent to which local people are involved in the management of natural resources and the challenges that limit benefits seen from timber harvesting activities in the area.²³ Respondents to the questionnaire were chosen using the convenience sampling approach, as determined by accessibility and availability during the data gathering period.

Data from key informants was gathered through semi-structured interviews. This approach enabled following up on new ideas raised during the interviews even if they were outside the originally designed interview guide but also allowed focus of predesign questions.^{24, 25} The interviews were conducted with: the Acting Chief Executive Officer of Kusile Rural District Council, who is also the District Administrator; local councilors in Lupane; Village Development Committees (VIDCOS); and the head of the Community Areas Management Programme for Indigenous Resources (CAMPFIRE) and its entire district committee. Legislators drawn from the Parliamentary Portfolio Committee on Natural Resources Management and Environment were also interviewed. The Parliamentary Portfolio Committee provides policy oversight on natural resources such as timber and community development. Other interviewees included the Programmes Coordinator of the Centre for Natural Resources Governance and the Head of Programmes of the Zimbabwe Environmental Lawyers Association (ZELA). The organisations were selected on the basis of their work in terms of natural resources and community development through advocacy and research.

Knowledge of the history and context regarding a specific setting comes, in part, from reviewing documents.²⁶ To this end, the research also relied on analysis of documents and reports on the issue under research. Documents analysed included the 2012 Census reports, records of council timber revenue and formal policy documents relating to timber harvesting in Lupane. The research also benefited from newspaper articles published in local newspapers as well as reports that were compiled by various organisations that work in the area. Some demographic, historical and geographical data on Lupane was sourced from the internet. The researchers also accessed alternative policy documents on natural resources and community development produced by organisations like the ZELA and the Centre for Natural Resources Governance in Zimbabwe. Observations were done during a field visit to the district. Observations focused on the availability and state of roads, bridges, schools and hospitals and the general state of development of the district.

DATA ANALYSIS

The data that was collected was processed through the Statistical Package for the Social Sciences (SPSS) and presented in tables, figures and charts. The study employed the thematic analysis approach, which is a qualitative analytic method for identifying, analysing and reporting patterns (themes) within data.²⁷ Themes or patterns within data can be identified in two primary ways:

- i. the inductive bottom up approach; and
- ii. the theoretical or deductive or top down approach.²⁸

In the inductive approach, the themes are determined by the content of the data. In the deductive approach, the coding and themes are developed using existing concepts or ideas.²⁹ This research used the deductive approach. The defined coding themes were transparency and accountability, corruption, centralised state/lack of devolution, participation, and environmental degradation. Other themes used for data analysis included environmental degradation, abuse of resources, non-compliance and underemployment.

PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

The results of the study indicate that local communities in Lupane are benefiting from the natural resources through profit sharing, infrastructure development and employment creation. These findings are consistent with arguments that, under appropriate conditions, natural resources can be a source of economic development for communities. Scholars have presented many arguments on how natural resources are a catalyst for economic growth and development.³⁰ The utilisation of natural resources and the subsequent revenue generated thereafter has helped other countries address key socio-economic concerns, such as poverty, health, infrastructure, education and unemployment.

The timber and timber related industry contributes significantly to the economy of Zimbabwe, accounting for an average 3 per cent of gross domestic product (GDP) and employing 8 per cent of the total people in the manufacturing sector.³¹ Other benefits include royalties paid by timber companies to access and exploit this resource. These royalties can be used for development, for example, to support infrastructure development projects like the construction and furnishing of schools.

Despite these direct and indirect benefits, there are community concerns regarding the sustainability of timber harvesting. The timber that is being harvested is not being replaced. In the future, this will have serious consequences on the environment, because trees play an important role as an anchor to a number of ecological services. An interesting finding was that the communities are not consulted in the timber harvesting decision making process. As a result, their voices and concerns regarding exploitation of this

resource are subdued. This exclusion, together with government disengagement, abuse by private companies, corruption, unemployment and environmental degradation were cited as factors that contribute to the state of poor economic development in the Lupane District. We discuss six of these in the following sub-sections:

- i. exclusion;
- ii. government disengagement;
- iii. abuse of timber of timber resource by private companies;
- iv. corruption;
- v. unemployment; and
- vi. environmental degradation.

The discussion focuses on these as important contributory factors to the sustainability of Lupane's timber resources and economic development endeavors.

EXCLUSION AND/OR LACK OF PARTICIPATION

Approximately 72 per cent of the respondents cited lack of participation in the management of their timber as a factor limiting development in Lupane. The participants argued that the means and methods of participation currently in place are inadequate and are just tokens meant to appease local communities. They added that this challenge needs to be addressed.

Community leaders echoed similar sentiments, stating that the 'tactical' exclusion of local people in the control and management of their natural resources was profound and impeding economic development in Lupane, although there was a veneer of participation through the royalties paid to communities. The Acting Chief Executive Officer (CEO) of the Kusile Rural District Council stated that the Lupane District previously operated three timber concessions, but these had ceased operations. The Nlabula Manase, Pupu and Tshongokwe concessions were cancelled in 2011, because the concessionaires were not meeting their contractual obligations. However, and as an indicator of how the local people are not included in the decisions regarding management of natural resources, council is struggling to terminate the Tshongokwe contract and the local community is not in a position to intervene. The company in control of the concession is under liquidation, but is 'clinging on to the concession'. The difficulty of terminating a contract of an underperforming concessionaire can be traced to the complex legislation (Forestry Act) that allocates final power and authority of forest resources to the Forestry Commission. The Commission has the final say regarding who exploits timber in Lupane. Despite this challenge of limited authority to control and manage resources within its jurisdiction, the Kusile Rural District Council CEO stated that there were efforts to revive the operations of other concessions for the benefit of local communities. Against this finding, we posit that the limited development in the district of Lupane relates to the exclusion or lack

of meaningful participation by the local people in the management of the natural resources.³² The Forest Act, which governs the use of forest resources in Zimbabwe, favours private landholders, to whom it provides guidance on how to apply for permission to cut trees, whilst preventing people in communal areas from harvesting woodland and forests in their localities on a commercial basis.³³

GOVERNMENT DISENGAGEMENT

The lack of adequate government control and oversight over private companies exploiting timber in the area was identified as another challenge in the management of the district's timber resources. About 47 per cent of the respondents were of the view that the government is not effectively monitoring the activities of the private companies exploiting timber in Lupane. This was said to result in non-compliance by some companies, which fail to even remit royalties to the council. Of the royalties that are remitted to the council by the timber concessionaires, only 30 per cent of the amount is paid to local communities for local development projects; the rest is allocated to nondevelopment works. It was stated that this 30 per cent was not enough to fund development works required by the communities.

The lack of monitoring of private timber companies by government officials has given rise to cases of companies breaching their contractual obligations. This has an impact on the development outcomes linked to the timber harvesting activities. A respondent stated that there was less monitoring of the concessionaires in the area resulting in lack of the development. The respondent stated that where and when the concessionaires breached their contracts and were threatened with due legal recourse, they immediately abandoned the area and established their operation on a different site in the district. This was stated as a major cause of unsustainable timber harvesting practices in the district. The end result was continued limited returns accruing to the district from this resource. The limited returns were identified as a major driver of poor infrastructure, such as the dilapidated school block with broken window panes, shown in Figure 7.2, despite being located in Tshongokwe, alongside Pupu and Nlabula Manase, where there are, or once were active timber concessions.

Figure 7.2: A dilapidated school block at Tshongokwe SchoolSource: Authors³⁴

This exclusion of the community in conservation has been identified as a cause for the dispossession, alienation and ultimately impoverishment of rural people in protected areas.³⁵ The end result is often: local communities that are then in conflict with the concession system; environmentally damaging and wasteful resource extraction methods; and a lack of local benefits for communities from the resource – in this case, timber. This can be addressed through enacting legislation that enables meaningful participation of local communities in the management and exploitation of natural resources, including timber.

One of the roles of the Government of Zimbabwe is to facilitate development in the various communities. Therefore, those in authority are meant to ensure that development is realised with Lupane included since the district is endowed with indigenous forestry. Such excellent timber can be used to develop the district. However, the officials are not concerned about community development as they protect private players who are abusing timber and other natural resources for their own benefit leading to unsustainable development. In the Lupane case, the Forestry Commission's operating policy of 1992 advocates local participation in forest resources management and benefits sharing with the local people and communities. This therefore proves that those that are meant to enforce the policy are ignoring it as the community continues to suffer.

The state is the ultimate provider of public goods, and the final arbiter and enforcer of the rule of law.³⁶ It has a legal role to play in ensuring that communities effectively benefit from their natural resources. The state is highly dependent on a small number of owners (rentier capitalists) for generating its income. The rentier capitalists, in return, are sometimes able to extract generous tax breaks, subsidies, and import protection. It

is important to point out that timber is a capital intensive venture, making it difficult for local communities to be in full control of the exploitation of this natural resource. Further, since these types of point-source resources tend to be more capital intensive than labour intensive, they tend to polarise society between the haves and have-nots, so that it is difficult to generate social consensus regarding the management of conflict. The views of the communities show their dislike of the private companies that exploit and harvest timber in Lupane. They further argue that during economic downswings, these vested interests resist reforms that would diversify the economy, because this would create 'rivals' who would compete for labour and government influence. However, this is not a license for the government to disengage. The government has to play a critical role in facilitating positive developmental outcomes that benefit the communities. Momentary prosperity may mask some fragile social arrangements, but there are always events that expose and exacerbate them

ABUSE OF TIMBER BY PRIVATE COMPANIES

The findings also indicated that local communities are contemptuous of the way private companies conduct timber exploitation operations in Lupane. The locals accused companies of not making any contribution to the development of the communities in Lupane. They stated that the firms were mainly concerned about realising maximum profits at the expense of the communities. This view was expressed by 36 per cent of the respondents who took part in this study, who stated that the abuse of timber and other natural resources by private companies is one of the factors inhibiting economic development in Lupane.

The ZELA Head of Programmes explained further, stating that where there is exploitation of natural resources, the likelihood of conflict is unavoidable, particularly because when investors come in to communities, they make a lot of promises to communities, especially when they are carrying out environmental impact assessment studies. He remarked:

The investors promise to construct roads, schools, hospitals and a whole lot of infrastructure, but the opposite happens ... in some cases, communities [even] get relocated and get displaced to make way for the investors.

This was pointed out as being one of the major reasons for conflict, because often the displaced local people are not adequately compensated.

This study makes the argument that a continuation of the current *modus operandi* in the exploitation of timber by private concessionaires and companies in Lupane poses a threat to the concept of environmentalism and sustainable development, because under these conditions, private companies will continue to abuse the timber for their sole maximum benefit. It appears as though the intention and main objective of the private

companies is to satisfy the needs of the current generation. There is no apparent regard for future generations. An interesting observation is that, under present conditions, not even the current generation in Lupane is benefiting from the timber as a natural resource.

CORRUPTION

The participants cited corruption as one of the factors limiting development as a result of timber harvesting in Lupane. They spoke about the lack of transparency and accountability in terms of concessions being awarded to firms that exploit natural resources in Lupane. They expressed suspicions that the awarding of concessions was done, not to benefit the communities, but to facilitate the accumulation of wealth by the elite and the powerful in the country. They stated that the corruptly awarded concessionaires were reckless and responsible for deforestation of the hardwood forests because they were carried out by people who were not following the proper harvesting procedures of hardwood forests. The theory of environmentalism and sustainable development postulates that environmental challenges pose a threat to development in a number of ways, chief amongst them being global warming (caused by excessive emissions of carbon dioxide) and the process of deforestation.³⁷ Forests play an important role in mitigating this effect.

The corruption sentiment was echoed by a senior manager from ZELA, who posited that the contracts that are signed between the state and timber harvesting companies are done with scant regard to how communities could benefit. He stated that the concessions, '... are a give-away as they benefit only a few'. He suggested that the contracts should be made available to people who want to scrutinise them, so as to increase transparency. Corruption was also linked to how revenue from timber concessions was being transferred to other regions and countries, disregarding Lupane's development challenge attributed to limited capital (revenue flight), which ultimately leads to the underdevelopment of the area. The race to the bottom argument was also raised as affecting natural resources led economic development in Lupane, where countries and regions compete amongst themselves to award incompetent and cheap concessions to investors often with minimal returns to the countries or regions. The respondents argued that it appears as though the main aim of the institutions in charge of these concessions is, 'to attract as many investors as possible without really negotiating the best deals for the communities'.

The claim reference in regard to state corruption as a critical impediment to community development emanating from timber harvesting supports the arguments made by resource curse thesis. The term 'resource curse', describes how, on average, countries with a large endowment of natural resources tend to perform poorly compared to countries that may be less well endowed with natural resources. It can be argued that Lupane, as a district endowed with an array of natural resources (including timber and wildlife) is experiencing the resource curse. Some of the major reasons for the curse include corruption and rent-seeking by public and private officials.³⁸

The findings on corruption also related to the observation that whilst it is difficult to estimate the magnitude of illegal logging, it is argued that as much as 15 per cent of global timber trade involves illegalities and corrupt practices, amounting to annual losses of assets and revenue in excess of US\$10 billion.³⁹ The negative impacts of illegal logging result in the impoverishment of forest landscapes and local communities that are deprived of significant forest revenues. It also strengthens organised criminal enterprises and leads the corruption of law enforcement and other officials.³⁸ In addition, the result of this wealth grab often leads to armed conflict, as seen in a number of Sub-Sahara African countries. In the case of timber concessions in Zimbabwe, in Lupane, there have been reports of corruption in the awarding of timber concessions. In 1998, forest managers covertly sold timber worth over one million Zimbabwean dollars to a saw milling company, with each of them receiving two hundred thousand Zimbabwean dollars in return.⁴⁰ Their covert operations were eventually discovered and the officials were dismissed from the Forestry Commission service.

UNEMPLOYMENT

The research found that while unemployment was high in the Lupane district, the timber companies that had invested in the area do not often employ local people. Instead they employ people from outside the district at the expense of the local people. The statistics show that the three timber concession companies that operated in the area at the time of this research had a total of 160 workers, with only 20 per cent of the workers being drawn from local communities.³⁸ Most worrying was that this 20 per cent was engaged in menial low paying jobs. This led to locals feeling as though they were only considered for hire as 'cheap labour'.

A noteworthy point at this juncture is the concern and focus on direct natural resources linked jobs that the timber industry provides. In this regard, we argue that the presence of natural resources like timber and wildlife, and the likelihood of methane gas exploitation in Lupane in the future, is leading to over-reliance on these resources for development and job creation, and diminishing the creative ability to initiate alternative sources of development, like manufacturing and production. The Dutch Disease effect partly explains this. *The Dutch Disease concept explains the apparent relationship between an increase in exploitation of natural resources and a decline in the manufacturing sector.*⁴¹

ENVIRONMENTAL DEGRADATION

The respondents cited the issue of environmental degradation emanating from exploitation of timber, and the attendant problems of deforestation, as factors limiting the natural resources-led economic development of Lupane. Timber logging companies were suggested as being the major abusers of the environment. It was observed that in the process of harvesting timber, the timber is dragged through fields to transportation trucks,

resulting in deep gullies that are not repaired. Such gullies can cause up to three per cent loss of soil per annum.⁴²

Environmentalism and sustainable development concepts postulate that environmental challenges pose a threat to development in a number of ways. Chief amongst these is the process of deforestation. The process of deforestation is threatening the district's ecosystem, which could adversely impact food supplies for the local community as well as the local flora and fauna. This is endangering the sustainability of the entire area. On a larger scale, the unsustainable timber harvesting in Lupane is destroying the carbon sinks, thus contributing to global warming, which leads to climate change. Ecologists and foresters are concerned about the rate at which the country is losing its hardwood reserves. They estimate that Zimbabwe is losing more than 300 000 hectares of trees (forest) per annum. Zimbabwe's woodland cover has fallen sharply in the past three decades to between 15 and 16 per cent.⁴³

Summing up, the uncontrolled and reckless harvesting of hardwood forest reserves by logging companies is impacting on the quality and quantity of water resources, the rate of hardwood regeneration and the environment, and contributing to rural poverty. The monitoring and management of the hardwood forests is extremely weak and this has opened the floodgates to the complex and organised crime networks involved in illegal logging and trade in timber products sourced from the country's forests in the Matabeleland North and Midlands provinces.⁴⁴

CONCLUSION

This study was carried out against a background of natural resources as a source of economic development in local communities, and focused on timber harvesting in Lupane. The research was necessitated by the fact that indigenous rural populations, like those in Lupane, survive on a combination of agriculture and natural resources, including timber. Timber is part of forest resources, with the government of Zimbabwe delegating control and management of forests to the Forestry Commission of Zimbabwe, through the Forestry Act. The Forestry Commission manages the forests for commercial benefit, as well as for utilisation by local communities on a small scale.

The exploitation of major forest products (timber and wildlife) is conducted by private agencies operating under agreement or licences that are subject to periodic review, in respect of a change in royalty rates, and species and sizes that concessionaries are obliged to take. Whilst the Forestry Commission's operating policy puts emphasis on forestry for the people and advocates participation in forest resources management and benefits sharing by local people and communities, the legislative framework does not enable this to occur.

Despite these shortcomings, the research made some critical findings that are helpful in addressing factors limiting natural resources-induced economic development in

Lupane and effective community participation in natural resources management. The communities participate through bodies like CAMPFIRE and share profits from timber harvesting. The study revealed that timber in Lupane is not being effectively harnessed for economic development in the communities, due to a number of factors, as listed in the findings. However, the major inhibiting factor lies in the legislation that empowers state entities to control the forest resources of the country, and who favour and protect private investors and exclude local communities. The study concluded that there was a need for policy and institutional strengthening to sustainability issues. Important steps towards this include:

- i. providing a legal framework to ensure the meaningful participation of local communities in the management of exploitation of local natural resources; and
- ii. ensuring the implementation of policy to curb both corruption and timber harvesting practices that threaten the sustainability of forest resources.

If these steps are adhered to, certainly this will result in sustainability of timber harvesting in Lupane.

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Institutional Dynamics of Mopane Woodland Management in Bulilima District of Zimbabwe

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ABSTRACT

In most communal areas of Zimbabwe, woodlands exist as common resources that are managed through local level formal and informal institutions. However, this exposes them to the risk of overexploitation, despite the fact that the woodlands play a pivotal role in climate change mitigation, i.e. acting as carbon sinks. Data gathered through participatory methods revealed that institutions managing mopane woodlands in the Bulilima district have an unclear mandate and jurisdiction. These institutions fall between fuzzy local traditional governance systems and state control that is far removed from the day-to-day management of the woodland. Interestingly, women play a prominent role in formal decision-making processes, in the absence of men who are mostly migrant workers in neighbouring countries. The paper concludes that the existing institutional dynamics are likely to lead to further depletion of mopane woodlands.

INTRODUCTION

Natural resource crises in Africa have been largely linked to centralised state control that is far removed from the day-to-day management of resources.^{1,2} There is increasing consensus in natural resource management literature that the cause of resource degradation is institutional, hence scholars argue that if rules and governance structures are adequate and appropriate, then natural resources will be used wisely and conservation goals will be met.³

This chapter discusses institutional dynamics in the management of mopane woodlands at a local community level in the Bulilima District of Zimbabwe. The study

is premised on the natural resource management approach in most communal areas of Zimbabwe being a *de-facto* open access tenure system, yet a myriad of structures and institutions are responsible for the management of these resources in these communal areas. This mix renders much of the country's natural resources at risk of being over-exploited. For example, the mopane trees in Bulilima are managed through fluid institutions and institutional structures. Such dynamics are exposing the woodlands to threats from population pressure in a landscape where the management of the resource has generally been weak. It is important to note that woodlands such as the Bulilima mopane woodlands contribute to livelihoods in many districts of Zimbabwe. They supply timber for fencing and the building of houses, host mopane worms that are consumed and partially commercialised, and provide firewood used in domestic and commercial applications.^{4,5}

THEORETICAL FRAMEWORK

New institutionalism theory (NI), also referred to as new institutional economics (NIE), was adopted to explain the role played by institutions in the study area. The framework emphasises the role of formal and informal tools, such as property rights, and rules and regulations for the governance of common-pool resources.^{6,7} Issues such as struggles over power, practices, justice, knowledge, trust, social capital, accountability and ethnicity are increasingly receiving recognition in an attempt to understand how institutions influence issues such as resource access, use and benefits.⁸

NI falls into three broad categories:

- i. rational choice;
- ii. historical institutionalists; and
- iii. sociological institutionalists.⁹

Rational choice institutionalists argue that individuals are utility maximising beings with an interest in institutions because they reduce the cost of transactions by providing clear arrangements of who is entitled to utilise a resource when and where. Credible commitments, combined with mutual monitoring and the existence or establishment of institutions can motivate individuals to become more engaged in collective action towards the realisation of a shared goal.¹⁰ Credible commitments can be made when individuals are presented with rules that meet a number of criteria or design principles, including: clearly defined boundaries; congruence between allocation, access rules and local conditions; users being able to modify rules; monitoring by accountable individuals; and non-compliance being followed by graduated sanctions.¹¹ The commitment is to follow the rules as long as: most similarly situated individuals adopt the same commitment; and the long-term net benefits are greater than the costs. The tenet of the new institutionalism

argument is that institutions or decision-making arrangements provide a mechanism by which individuals can transcend the tragedy of the commons.¹² Historical institutionalists, on the other hand, argue that social outcomes are usually the product of interaction between various groups, interests, ideas and institutional structures. They view the decision-maker as a perfectly rational individual who acts by calculated rationality. They also assume a situation of bounded rationality, and that coordination of economic activities involves more than just transactions in markets in which price is the sole consideration.¹³ The third group of new institutionalists, the sociological institutionalists, argue that individuals are embedded in cultural and organisational sectors that determine their interests.¹⁴ All these views attempt to explain the role of institutions in society.

There are two notable definitions of institutions. One refers to institutions 'as rules of the game – that act as external constraints'.¹⁵ The other defines them as '... the rules of the game in a society, or more formally, the humanly devised constraints that shape human interaction'.¹⁶ This work adopts and combines these definitions by viewing institutions as 'the prescriptions that humans use to organise all forms of repetitive and structured interactions, including institutionalised cultural values, as well as formal organisations'.¹⁷ Merely focusing on institutions as formal and informal rules may provide too narrow a perspective, given that there is often a mismatch between rules and what people actually do.¹⁸ Rules cannot easily be analysed independently.¹⁹ Instead, focussing on actors, their interests, their value systems, whom and what these actors represent, what they say they do and what they actually do in practice, may provide a deeper understanding of the role of different institutions in natural resource governance. Furthermore, institutions often form nested structures in which higher level institutions set limits to the procedures and alternatives that are available at lower levels. In most cases, they constitute agents in particular ways, vesting them with different powers, immunities, rights and duties.²⁰

At a pragmatic level, institutions play a role both in causing and in mitigating environmental problems.^{21,22} They shape the perception of and professed solutions to such problems. Institutions are embedded in the specifics of culture, history and social practices, which vary substantially across different social settings.^{23,24} The impact of institutions on environmental problems and decisions, therefore, varies from one context to another. This means that generalisations from specific cases must be made with caution, and after giving adequate attention to their context.^{25,26}

It is, however, important to note that institutions responsible for natural resource governance are often characterised by conflict and ambiguity as much as they are by harmony and complementarity. In particular, power relations are embedded in institutional forms, 'making contestation over institutional practices, rules and norms always important'.²⁷ Thus, institutions are shaped in a space of interests, values, conflict and coordination. Therefore, a deeper understanding of institutions (including actors), interactions and power dynamics may be the key to better informing policy with regard to appropriate natural resource governance and management.

In drawing on the seminal work of North²⁸ and Ostrom,²⁹ many scholars have provided an in-depth examination of the characteristics of the institutional frameworks necessary for sustainable resource use. Moreover, many scholars have been influenced by the NI theory in coming up with empirical studies on collective action in common-pool resource management contexts^{30,31} and this body of literature is referred to as common property theory.³² The common property resource (CPR) theory suggests that individuals will collectively manage common resources when the benefits from the institutional set-up (i.e. rules and means of enforcement) are limited to a small and stable community.^{33,34} The following section narrows the discussion to a focus on the governance of common-pool resources in Southern Africa.

GOVERNANCE OF COMMON-POOL RESOURCES IN SOUTHERN AFRICA

Common-pool resources are characterised by property rights that are either open access or distinctly common property rights. In the case of state property, it is thought that without proper enforcement state resources may end up resembling open access resources where there is a 'free for all' scenario.^{35,36} Past governance systems, particularly pre-colonial systems, had the capacity to develop relatively effective indigenous institutions for the management of their resources.^{37,38,39} Power and access to natural resources were embedded in religious beliefs. In the pre-colonial Zimbabwe, resource conservation was achieved through common property regimes, with precise rules regarding inclusion and exclusion, rights and obligations.⁴⁰ Within the sociocultural milieu that prevailed then, customary institutions, notably chiefs, headmen and spirit mediums, who were seen as the designate representatives of the ancestral spirits, had authority to sanction natural resource use.⁴¹ This form of common property ownership was very efficient in common-pool resource management, in the sense that it was economically viable, ecologically sustainable and organisationally efficient. Compliance with the rules that regulated the use of the resources was internally generated and not externally imposed.⁴²

In Zambia, Haller and Chabwela recounted the complex resource management history of the Kafue Flats wetlands.⁴³ Here, resource abundance and reportedly effective governance of common-pool resources by indigenous institutions had been replaced by conflict and competition between local and immigrant resource users, as well as between indigenous and state institutions. Fisheries and other resources were degraded and over-used. This led to increased vulnerability, particularly amongst the poor and powerless, who suffered from loss of access to common pool resources that were taken over by more powerful users.⁴⁴ Immigrant fishermen had more bargaining power to change the previous common property regime to an open access system, from which they derived profit, exposing the dysfunctional role of the state, which was mandated to protect local users. The state was found to be both present and absent, i.e. present in its ideological claim of

resource ownership and management authority; but absent largely in terms of effective, competent resource management.

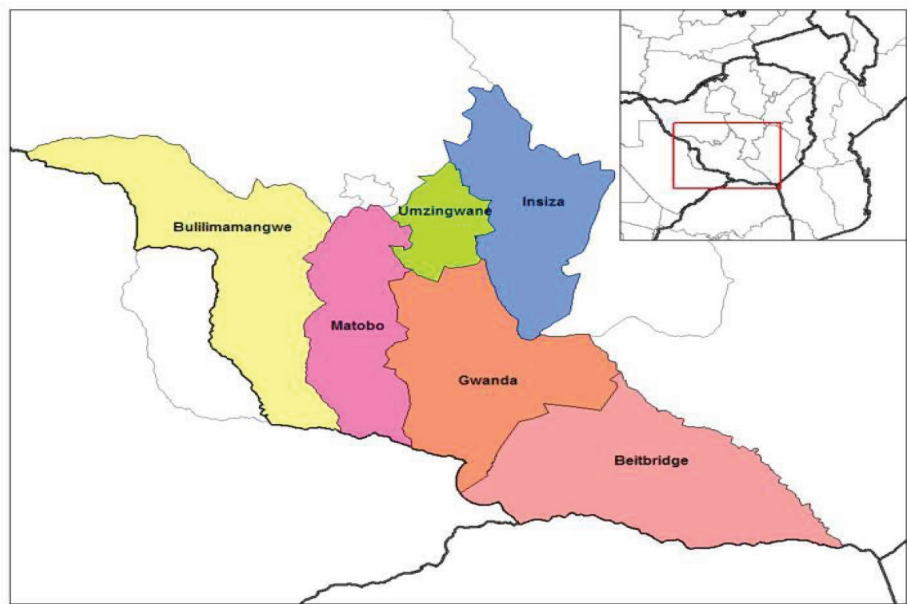
In contrast, a study conducted in Botswana on the governance of common-pool resources in the Okavango Delta revealed intriguing claims.⁴⁵ For instance, common-pool resources were generally not found to be under stress, because local people were not entirely dependent on them. The diamond revenues, which have resulted in a strong economic base, seem to have trickled down to the people in this study area.⁴⁶ Interestingly, such outcomes are universal to all communities in Botswana. Magole's research on 'shrinking commons' in the Lake Ngami grasslands in Botswana is consistent with literature that sees disintegration in the traditional management systems of common-pool resources.⁴⁷ It can be concluded, therefore, that livelihood alternatives in an environment where natural resource management institutions are either weak or fragmented usually result in the degradation of common-pool resources. This is usually the case when communities depend heavily on the resource. In Bulilima, communities depend heavily on mopane woodlands, because it is the major tree species, putting it under enormous stress.

It is in this context, therefore, that this study seeks to examine the role played by local level institutions in the sustainable use of mopane woodlands, which are a major source of livelihood for local communities in the Bulilima District of Zimbabwe.

MATERIALS AND METHODS

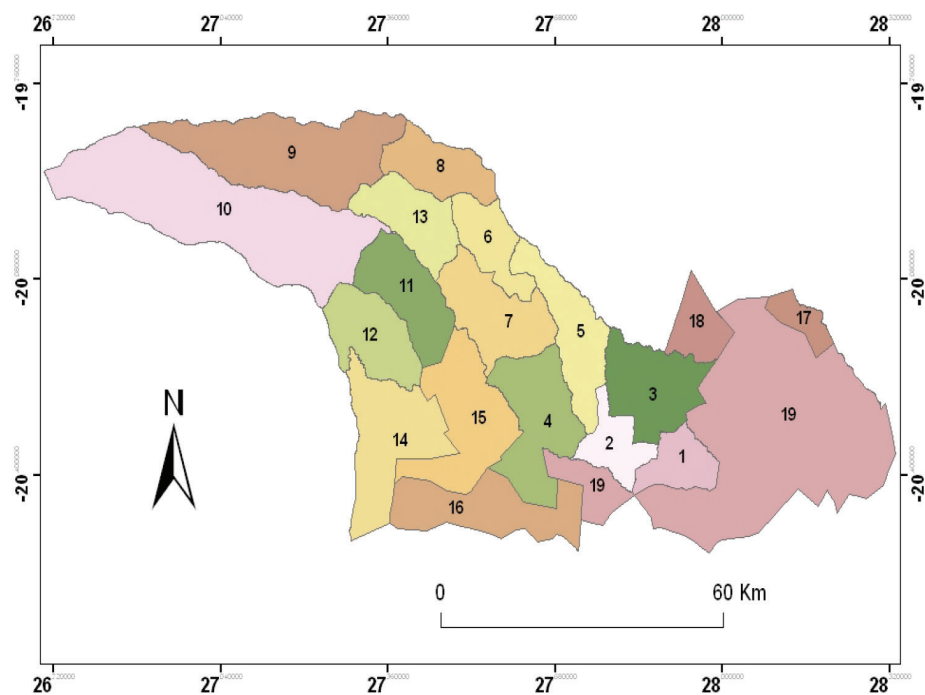
The study was carried out in the Bulilima District, in Matabeleland South province in Zimbabwe (Figure 8.1). The district has 19 wards that are characterised by multiple livelihood strategies, including mopane worm harvesting and commercialisation, mopane firewood commercialisation, communal farms, small-scale mines and irrigation schemes.⁴⁸ The entire district lies within Natural Regions IV and V, which are characterised by a short, variable rainfall season, averaging generally below 400 mm per year, and long dry winter periods.⁴⁹ The district's predominant tree species is *Colophospermum Mopane*.⁵⁰

Figure 8.1: Map of Matabeleland South province



Source: Authors⁵¹

Figure 8.2: Ward map of Bulilima district



Source: Authors⁵²

In Figure 8.1, Bulilima district is shown as one big district (Bulilimamangwe) before it was divided into the Bulilima and Mangwe districts in 2002. In Figure 8.2, Bulilima is shown as a separate district after 2002.

The wards selected for this study were Makhulela and Bambadzi. These wards were selected because of their extensive cover of mopane woodlands which, however, is now being threatened by over-harvesting, over-population and general institutional inefficiency. The selection of the two wards ensured a comprehensive intensive ethnographic analysis that unearthed deeper understanding of institutional dynamics governing the management of mopane woodlands. Triangulation involving document review and primary data collection using different methods was used to improve the reliability and validity of the generated data. Primary data collection involved various participatory techniques, including six focus group discussions with various groups of men, women, youth, local leaders (traditional leaders such as village heads), representatives from the Ward Development Committee (WADCO) and the Village Development Committee (VIDCO) and people involved in the natural resource committees found in all the villages under study. Each group comprised between eight to 12 respondents. Key informants were identified based on their expert knowledge about the history of the study area. Through interviews, they provided valuable data on a variety of issues, including indigenous knowledge about the management of mopane woodlands, the importance of mopane woodlands to local communities, and institutions responsible for Mopane woodlands governance. Key informant interviews (KII) were conducted with the Bulilima Chief Executive Officer (CEO), the District Administrator (DA), the VIDCO and WADCO chairpersons, Chief Makhulela, four village heads, the elected councillor for Makhulela, officials from government organisations (such as the Environmental Management Agency (EMA) and the Forestry Commission (FC)), officials from non-governmental organisations (NGOs) operating in the district, and community members selected because of their knowledge of the area, their position and wealth status in the community. Document review complimented the primary data.

RESULTS AND DISCUSSIONS

Data analysis revealed that both formal and informal institutions operated at the same time in the governance of natural resources in Bulilima.

FORMAL INSTITUTIONS

Understanding formal institutions (sometimes referred to as modern institutions) affecting sustainable management of mopane woodlands in Bulilima district cannot be fully comprehended without discussing the institutional policy framework governing woodland resources in Zimbabwe. The country has seen a concerted effort to move from state

centred approaches towards decentralisation and participatory resource management.⁵³ The idea was to empower local communities and encourage them to be part of natural resource management in their communities. Noble as the idea is, the reality is that not much has been achieved in terms of ensuring local participation and natural resource access. As such, some formal institutions have been regarded as perpetrators of the colonial system of natural resource governance.^{54, 55}

The principal legislative provisions governing woodlands in the communal areas are the Forest Act of 1982,⁵⁶ the Communal Lands Forest Produce Act of 1987⁵⁷ and the Rural District Councils Act of 1988.⁵⁸ The Forest Act of 1982 governs the establishment and protection of state forests, while the Communal Lands Forestry Produce Act of 1987 prohibits the commercialisation of forest products in all communal areas. The Rural District Councils Act of 1988 gives district councils power to act as the local planning and development authority and enact legally binding land use and conservation by-laws that apply to areas under their jurisdiction.⁵⁹

The FC, through the Communal Lands Forestry Produce Act of 1987, regulates and monitors the use of all woodlands in the district. Mopane woodlands, being the dominant species in the Bulilima area, is given special attention. The focus group discussions revealed that the FC is very active in enforcing its regulations on the use of mopane woodlands. However, while locals are not allowed to cut down trees in the mopane woodlands for firewood or commercial purposes, 'outsiders' can exploit any woodland resource through the use of permits acquired either from the FC or the Rural District Council (RDC). Noteworthy is that most villagers cannot afford these permits. Currently, the conservation section of the RDC is directly responsible for woodland management at village level, but the legislative basis of this responsibility is unclear. FC officials monitor any infringement of conservation regulations, meaning that traditional authorities have a very limited role in managing mopane woodlands, yet they are the people on the ground. The permits are silent on quantities of woodland resources that can be exploited through the issued permits during the period of validity, which means that people who obtain a permit are free to exploit as much as they can. This implies that the permit system is inadequate to protect the Bulilima mopane woodlands from overexploitation. This is a classic case of government policies disempowering locals. During the colonial era, mining contractors extracted wood from native reserves 'with the blessing of native commissioners who offered timber to the miners at concessionary rates in affirmative recognition of the mining industry's contribution to overall development'.⁶⁰ The natives were not allowed similar privileges to exploit their own resources. In post-colonial Zimbabwe, the situation remains unchanged, as the monitoring systems imposed by the government still disadvantage locals from benefiting from local natural resources exploitation activities.

Permit fees accrue to the RDC and FC. They are rarely used for development projects in the communities where the resources are harvested. Community members are therefore disempowered by national legislation, i.e. the Communal Lands Forestry Produce Act of 1987.⁶¹ The community members indicated that some of their resources are extracted

clandestinely at night. There are allegations that those who exploit natural resources at night have bribed government officials, including the police, the RDC and the FC – hence they are never arrested. A community member in a focus group remarked:

We hear and sometimes see lorries at night carrying firewood and river sand. We have reported this to the RDC, but nothing is being done. We are now afraid of being victimised, because we hear some of the people who exploit our resources are well connected in government.

(Excerpt from a focus group discussion with men in Makhulela).

This has resulted in some local people also exploiting the woodland in an unsustainable way, because they feel they are not benefitting from it. A community member said:

We are told not to cut mopane trees for sale, but many young and even old men are doing that. They cut firewood to sell, because the woodland might get finished we are not benefitting from it. [It's] Better we all harvest and benefit.

(Excerpt from a focus group discussion with men in Bambadzi).

It is important to note that although the RDC, through its conservation committee and the FC, prohibits locals from excessive exploitation of mopane woodlands, monitoring is generally weak and is based on threats, rather than punitive action. Moreover, there is only one FC officer covering the entire district, because the department does not have the capacity to increase its staff complement. Compounding the challenge, is the problem of the conservation committee not having the capacity to visit remote wards such as Makhulela. As a result, local people's use of the mopane resource is managed more by traditional institutions, which are disempowered, rather than by modern institutions.

The Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) is an institutional structure within the RDC of Bulilima, which is meant to ensure that local people benefit from the use of their local resources, including mopane woodlands. However, CAMPFIRE has tended to concentrate on the management of wildlife, which generates more income than other natural resources in the district. Mopane woodlands, which could benefit from similar arrangements, are left to be exploited as a common-pool resource, mostly because it does not generate quick income for the local elites.

The research findings also revealed that there are natural resources committees in all villages in the district, which are meant to monitor natural resource use at a local level. These committees are comprised of community members and they report to the RDC. Women were found to be the majority members of these committees, a situation influenced by the migration of young and middle-aged men to neighbouring countries in search of employment. While this has put women in leadership positions in local level organisations that relate to the management of natural resources, the study revealed that these committees are practically powerless to control the exploitation of mopane

woodlands. In a focus group discussion with one of the committees in Makhulela, the members confessed that their committee is just a committee in name, stating:

We are just in the committee by name. To be honest with you, we never really sanction anyone for over-harvesting resources here. We always see scotch carts full of mopani wood going to Plumtree town. Who can we tell? The council says we should apprehend those people and bring them to the council, but who amongst us can do that? This is a job for men, not women.

(Excerpt from a focus group discussion with women in Bambadzi ward, 10 March 2014).

The absence of men in these committees significantly reduces their power and influence. In a patriarchal society where men make the rules and dominate in all forums outside the home, decisions about natural resource management are better left to them.

VIDCOs and WADCOs are local government entities created to foster development at a local level. They are relevant in this discussion, because over the years they have provided a different dimension to natural resource governance and development in Zimbabwe. They owe their existence to the Prime Minister's directive of 1984, which also saw the establishment of Provincial Governor posts. The Provincial Governors are appointed by the Prime Minister,⁶² based on loyalty to the ruling party, Zimbabwe African National Union Patriotic Front (ZANU PF). In state rhetoric, VIDCOs are there to promote local decision making and are meant to be structures that promote democratic governance. In some circles however, the formation of VIDCOs was seen as a ZANU-PF mechanism for controlling people from Matabeleland who predominantly supported the main opposition party, Zimbabwe African People's Union (ZAPU), at the time.⁶³ The infiltration of VIDCOs and WADCOs by the ruling ZANU-PF party has seen them carry the stigma of being politically sponsored institutions that are merely a grassroots extension of the ruling party.⁶⁴

Indeed, focus group discussions with the locals revealed that these institutions still perform the same roles as intended at their inception, although their activities are now less pronounced. This could be because, at the time of this research, ZANU-PF had firm control of the Matabeleland region. Nevertheless, discussions showed that VIDCOs and WADCOs are partisan in nature and, in some cases, certain positions are clearly reserved for ZANU-PF members. In one of the group meetings with local men of Makhulela, it was pointed out that external people who come to exploit mopane woodlands in the area are protected by VIDCOs. There is a belief among some local members that, through the chairpersons, the VIDCOs only serve the interests of those who are loyal to the ruling ZANU-PF party. Outsiders linked to the ruling party are less restricted from exploiting local resources compared to locals, especially those who are suspected of being members of other political parties. An old man in Bambadzi bravely pointed out:

As long as you belong to that party, you know the one I am referring to [ZANU-PF] ... you can cut as much mopane wood as you want, because leaders here also belong to that party. But if you are known to be of the opposition and are found selling firewood you will be in serious trouble ...

(Excerpt from an interview with an old man in Bambadzi, 12 March 2014).

Such perceptions are critical, because they point to the fact that, in Zimbabwe, although local government structures are powerful, they are not relevant to the development of local communities. Instead of assisting local communities to manage their natural resources effectively, they instead promote corruption through legitimising the action of those from government and the politically connected.

Traditional leadership's influence in natural resource management has been at the mercy of both colonial and post-colonial governments. Chiefs have been constantly empowered and disempowered to suit the policies and agendas of the governments in power.⁶⁵ The fact that the government has a hand in their appointment, makes them an easy tool for government control at local levels. It is not surprising that traditional leaders are therefore unpopular with those who do not support the ruling party. Nevertheless, they are empowered to enforce rules and exact fines from those who indiscriminately cut down mopane trees. However, group discussions revealed that the financial penalty for transgressions are administered in a partisan manner, depending on the political party one is affiliated to. In most cases, the collected fines are siphoned by the RDC, in a typical case of higher level authorities decentralising costs, but retaining control of the accruing revenues. In addition, the fines rarely benefit the local communities of Bulilima.

INFORMAL INSTITUTIONS

Informal institutions are sometimes referred to as traditional or indigenous institutions; they do exist and play a key role in the sustainable management of mopane woodlands in Bulilima to a certain extent. While traditional leadership (chiefs, headmen and kraal-heads) can be viewed as the extended arm of local government, which enforces all environmental planning and conservation by-laws, it also serves as the custodian of traditional or indigenous rules that govern the use of natural resources within communities. Traditional management, as informal institutions are often referred to, are based on customary rights to resources. These rights base their legitimacy on the historical existence of the local people, who claim them within a certain geographic area. The people of Makhulela and Bambadzi claim to have been pushed into these areas in the early 1950s by the white colonial government. They have since developed institutions that have enabled them to coexist with their ecological environment, which is dominated by mopane woodland species. Over the years, they have learnt to use the woodlands sustainably. In one focus group discussion with women, it was revealed that mopane trees command

a measure of respect in communities, because they provide communities with products such as mopane worms, which are considered much more valuable than firewood. Almost every year, the locals harvest mopane worms from mopane woodlands and the worms are a significant source of livelihood. There is a belief amongst community members that mopane worms are a gift from the 'gods', hence in every mopane worm season, a few elderly people are chosen to take some of the worms to the Manyangwa spiritual group. The Manyangwa religious cult historically represented the Kalanga people's strong religious sphere. It survived the onslaught of colonisation, when the Rhodesian government attempted to control people in Bulilima by deposing Kalanga chiefs and legitimising Ndebele chiefs as custodians of traditional beliefs.⁶⁶ Today the cult represents different ethnic groups (Kalanga, Ndebele, San) residing in the Bulilima district.

The study revealed that part of the Manyangwa religious cult's role was to protect natural resources and communities in the district. The cult was said to be visited every year to perform religious practices related to rain making. It was believed to be responsible for bringing good rains, which ensures an abundance of ecological products such as mopane worms and woodlands. Interviews with traditional leaders and other elders in the study area revealed that the outbreak of mopane worms symbolised that the 'gods' were happy. Similar sentiments were also raised by Phathisa Nyathi, a well-known historian in Zimbabwe, who has done extensive research on the Kalanga and Ndebele ethnic groups in Matabeleland region. Some scholars thus argue that policies aimed at natural resource management at a local level should consider such traditional institutions, since they influence local people in terms of the selection and integration of external beliefs and practices in the local practices.⁶⁷

An interview with chief Makhulela revealed that conservation of mopane resources is closely related to the origins of the locals. The people who claim their origin in the area were said to be generally respectful of mopane trees, especially the larger ones. They know that these should never be cut unless for very special purposes. However, those who have been recently resettled under the Fast Track Land Reform and Resettlement Programme (FTLRRP) do not have such respect. The discussions revealed that newly resettled people do not abide by local traditional norms with regard to natural resource use, leading to them indiscriminately cutting down trees. An elderly male from Bambadzi remarked:

The problems we have in this area are people who come from the resettlements and just cut down trees. They have destroyed big mopane trees that we respect, because they gave us mopane worms. These resettlement people are very difficult to control, because they always claim to have authority from the powers that be [government and the ruling party]. At times we are powerless and very soon our resources will be finished and we will suffer when we want firewood.

(Excerpt from group discussion with elderly men from Bambadzi).

This assertion shows that there is selective application of traditional (and modern) laws. The newly resettled locals, who live in nearby villages, seem to be protected by institutions that are more powerful than the local institutions governing the locals. Perhaps it is a question of customary rights being seen as inferior to statutory and other rights.

DISCUSSION AND CONCLUSIONS

Mopane woodlands management in Bulilima was found to be influenced by multiple structures operating at the same level, but guided by different policies, legislation and institutions. In a study of woodland and water management in Chivi district of Zimbabwe, Nemarundwe noted that communal areas of Zimbabwe are often riddled with multiple resource management structures that operate with an unclear mandate and have overlapping jurisdictions and responsibilities.⁶⁸ This was also evident in the Bulilima districts, where parallel hierarchies formed by local government and the traditional authority systems often competed to control mopane resources, resulting in institutional ambiguity. These contestations manifested in power struggles that resulted in those with vested interests and stronger political positions and latitude exploiting the resources in an unsustainable manner.

Generally, formal institutions tended to be more powerful, because of their reliance on influential scientific knowledge and state backing. Consequently, indigenous knowledge and authority were subsumed into formal state governance. An analysis of traditional governance structures revealed that they had become instruments of the state. They were found to be more accountable to the political and government hierarchy than the community members they are supposed to serve. In addition, they were found to be weak from a history of being empowered and disempowered by a series of public policy and legislation changes.⁶⁹ As such, indigenous practices and local knowledge is only recognised as far as it serves the interests of the state. While legislation such as the Communal Land Forest Produce Act of 1987 allowed traditional authorities to control local use of natural resources, the legislation also opened local resources to state control, by giving more power to the Minister of Environment and less to traditional leadership structures. Under the Communal Land Forest Produce Act of 1987, the minister can issue permits to anyone to exploit forest resources from any communal area. This means that local traditional concerns, aspirations and practices can easily be overlooked.

Situating natural resource management in the domains of the RDC and government agencies, such as the FC, marginalised non-western knowledge systems. In such situations, 'other knowledges' are rendered suspect, and are discredited, excluded and 'disqualified'.⁷⁰ For instance, whereas the FC officer in the Bulilima District emphasised that the commission was closely monitoring the cutting down of mopane trees, which have become endangered, local concerns were focused on managing the trees through pruning and even removal, particularly in grazing areas, because their thick growth is known to

hinder the growth of domestic animal pastures. The commission either failed to see or overlooked the priorities of the local people. The locals prioritised pastures over the thick mopane forests, because of the importance of livestock in the district.

In conclusion, the complex institutional arrangements currently in place to manage mopane woodland resources in the Bulilima District (and perhaps elsewhere in Zimbabwe) are unsustainable. The struggle over power to influence and control resource use can only serve to create opportunities for those with more decision making powers to exploit resources as they choose. It is imperative that responsible authorities from both modern and traditional structures spell out the role of both institutions if natural resources in most communal areas of Zimbabwe are to be managed in a sustainable manner.

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Challenges and Opportunities in Addressing the Environment- Economic Growth Conflict in Urban Development

A Focus on Addis Ababa, Ethiopia

Ishmael Sango

ABSTRACT

During the past 20 years, Ethiopia's economy has been recording rapid and broad based economic growth. Notwithstanding the notable progress made in the critical aspects of social development, Ethiopia still needs considerable economic investment to sustain the envisaged economic growth momentum. The aim of this paper is to investigate whether or not Ethiopia's economic growth process is environmentally sustainable. Specifically, it seeks to examine the policy and governance interventions in place or not in place to secure environmentally sound, green growth, particularly in the current era of worsening climate change constraints and associated stressors. A case study approach will be employed, with the focus being on the national capital, Addis Ababa. Data for the study will be drawn from a wide range of data sources, including: a review of policy and other documents; in-depth interviews with government agencies, the business community, local development partners and the general community; and structured field observations at critical environmental hot spots. The findings of the study suggest that while Addis Ababa is currently recording remarkable economic growth, in terms of infrastructure provision, growth and diversification of industry, the following remain significantly weak: poverty alleviation and housing, and institutional commitment to address emerging environmental externalities. Political will and the strengthening of good governance constitute a vital condition for Ethiopia's urban development endeavours to follow an environmentally sustainable and climate-resilient path. The study recommends the establishment of a multi-dimensional

approach in reconciling economic demands, social equity and environmental integrity in urban development initiatives.

INTRODUCTION

Urban centres in Ethiopia and elsewhere are increasingly viewed as the core of socio-economic development and civilisation. On the other hand, the same urbanisation and urban growth form a vicious combination that brings about a variety of challenges, among which is environmental degradation.¹ The degradation challenges are becoming even more insurmountable to emerging economies such as Ethiopia, due to the emergent climate change impacts and associated stressors. It is therefore increasingly becoming a challenge to implement initiatives that will ensure socio-economically and environmentally liveable urban conditions, unless serious commitment is made to effectively guarantee environmentally sustainable and climate-smart green economies.²

In the economic and environmental fields, the notion of decoupling environmental degradation and economic growth has become increasingly topical in the face of increasing conflict between economic production and environmental sustainability.³ When applied in this context, it implies the ability of an economic system to thrive without adversely compromising the productivity of environmental goods and services.⁴ This study explored challenges and opportunities in addressing the environment-economic growth conflict in urban development processes in Ethiopia, particularly in the face of a changing climate and its associated impacts. The study ultimately seeks to explore cost effective innovations for environmental sustainability in general and transformative urban green economies in the context of increasing climate change risks in the country. Specifically, the study seeks to: describe the state of the environment in and around Addis Ababa; examine the performance of key environmental infrastructure and services in Addis Ababa; analyse the institutional, policy and governance interventions in place (and not in place) to secure environmentally sound and climate resilient economic growth; and prescribe climate-smart measures of intervention towards the effective decoupling of environmental degradation and economic growth in Addis Ababa and Ethiopia.

The chapter consists of the following sections: an introduction; background to the study; methodological approach to the study; a brief theoretical framework of the study; presentation of results and discussion of findings; and lastly, a conclusion to the study and a couple of recommendations for environmentally sustainable and climate resilient urban growth and development in Ethiopia.

BACKGROUND

Since the mid-1960s, there has been mounting global, regional and local pressure against unsustainable production systems and lifestyles to discourage traditional production systems and lifestyles that have since proven to be environmentally unsustainable.⁵ In this regard, the concept and principles of a green economy are increasingly being considered by nation states, societies and communities.⁶ The 1992 Earth Summit in Rio de Janeiro on Environment and Development constitutes a significant step forward in refining the concept and practice of sustainable development. The Summit established new priorities and instruments for use towards sustainability, including the concept of green economies in the face of the growing complexity of climate change induced risks and associated implications. In order to effectively address the newly emerging development challenges, the Summit proposed a more robust local level institutional framework for the future, i.e. the Agenda 21 blueprint.⁷

Sustainability is a multi-faceted concept that is frequently invoked in the environmental discourse. The sustainability philosophy calls for the harmonisation of environmental, social equity and economic demands as the most rational way onto a transitional path towards green growth and development.⁸ Despite the increasing consensus on the need for a practical attempt to develop sustainability and green economy initiatives, the chances of effectively attaining environmental sustainability remain questionable, in light of continued environmental degradation, climate change, overconsumption, and society's pursuit of accelerated demand-driven economic growth.⁹ Seeking to meet the ever-growing demands of modern society from the dwindling ecosystem is proving to be difficult in most economic, social and political contexts.

Given the common difficulties encountered by societies and economies in grappling with the goal of a green economy, sustainability must be taken as a human ambition for a transformative developmental process based on set out common goals and values.¹⁰ Sustainable development calls for a change in the political and socio-economic mindset across scales and governance regimes, which requires an enabling institutional environment.

In the context of less and least developed nations, a major hurdle to achieve sustainability is the prevalence of poverty.¹¹ It has been widely acknowledged that poverty is a crippling constraint in addressing the challenge of environmental degradation. It is on this basis that, in 2000, the United Nations (UN) developed the Millennium Development Goals (MDGs), as a practical measure of addressing the real development needs of local populations in less developed nations. The MDGs, together with the newly set Sustainable Development Goals (SDGs), provide: an opportunity for a more refined focus on practical sustainable development issue; the opportunity to measure and monitor the development performance of economies, societies and communities; targets and instruments that can be used to measure achievements.¹² In this regard, poverty was taken as goal number one, as it is both a cause and a consequence of environmental degradation and a major

obstacle to prospects for sustainable green economies climate change adaptation and mitigation towards sustainable green economies.

Several global and regional environmental conventions and initiatives have been ratified by most nations of the world, but what remains a challenge is the glaring gap that persists between the ratification of these agreements and action at national and local level.¹³ Ethiopia, for example, is among the many African countries that have ratified the Libreville Declaration on Health and the Environment, and the country has since been striving to be part of an international drive to mitigate environmental degradation trends, both at local and global level.¹⁴ It is important to note that while this implementation constraint applies to all regions of the world, it is most conspicuous in less developed countries and Ethiopia is among many nation states struggling to follow a path of environmental sustainability in the context of its economic growth and development endeavours.¹⁵ Besides the development challenges traditionally affecting Ethiopia, the country's Sahelian geographical situation aggravates its imminent exposure to climate change induced risks and associated adverse biophysical and socio-economic impacts on livelihoods and the economy. This study will therefore explore the challenges and prospects for environmentally sustainable and climate smart urban growth and development in Ethiopia.

While urban centres in Ethiopia and elsewhere are increasingly viewed as the core of socio-economic development and civilisation, it is equally observed that the same urbanisation and economic growth patterns form a vicious combination that brings a variety of challenges, among which is environmental degradation at various geographic scales, ranging from local to global.¹⁶ Although acknowledged that for most countries, including Ethiopia, it is a challenge to implement the processes that will bring about socio-economic and environmentally liveable urban conditions, there is a need to consider this dual nature of cities, so as to create a balance and guarantee environmentally sustainable or green economies.¹⁷

From both an economic and environmental perspective, the term decoupling (of environmental degradation and economic growth) is becoming widely referred to, due to increasing evidence of mounting conflict between economic production endeavours and environmental quality.¹⁸ In this regard, the decoupling initiative implies an institutional capacity building process to enable economies to grow without exerting a corresponding increase in environmental externalities. It is the concern of this study to explore challenges and opportunities in addressing the environment-economic growth conflicts in the urban development process in Addis Ababa Ethiopia. The paper ultimately seeks to explore cost effective innovations for environmental sustainability in general and transformative urban green economies in the context of increasing climate change risks in Ethiopian cities.

Specifically, the study seeks to: describe the state of the environment in and around Addis Ababa; examine the performance of key environmental infrastructure and services in Addis Ababa; analyse the institutional, policy and governance interventions in place

(and not in place) to secure environmentally sound economic growth in Addis Ababa; prescribe possible interventions for effective decoupling of environmental degradation and economic growth in Addis Ababa and Ethiopia.

METHODOLOGY

A case study approach was applied, using Addis Ababa, which is the economic hub of the country. The broad methodology of inquiry used in this paper is qualitative in nature. It is rooted in the phenomenological paradigm that emphasises understanding, analysing and describing phenomena without necessarily relying on quantitative measurements and statistics.¹⁹ Qualitative approaches are characterised by a focus on the qualitative interpretation of people's perceptions and the meanings attached to community experiences, attitudes, beliefs and value systems.²⁰

A field survey was conducted using a mix of data collection methods to gather primary data, while significant attention was also paid to secondary data collection from published government documents, published and unpublished research articles and other literature. Selected government and non-government officials were interviewed to elicit relevant data. Households and other affected and interested stakeholders were surveyed by means of a questionnaire, while field observations were conducted on selected sites and phenomena to ground-truth data collected. In terms of spatial scope, the survey was conducted in four selected zones in the city, i.e. *Yeka* sub city, *Bole* sub city, *Piasa*-Stadium zone and the industrial zone of *Akaki* sub city. A wide spectrum of stakeholders in the study area formed part of the sample. These include:

- Residents in the low, middle and high income brackets. (Total sample: 4 x 30 households)
- Large scale industrial establishments and related MSEs. (Total sample: 10)
- Large scale commercial retailers and informal vendors. (Total sample: 30)
- Government and non-governmental agencies (NGOs). (Total sample: 10)

THEORETICAL FRAMEWORK

Over the past few decades, there has been increasing awareness and understanding of the science of climate change. According to Fillion,²¹ predicted weather-related events, associated risks and consequent disasters have necessitated an urgent need for new approaches to human settlement siting and planning to enhance increased resilience to the imminent risks. At various geographical scales, a mix of policy responses is being adopted, ranging from sustainable urban planning and management to visionary environmental conservation practices. However, at all spatial scales (global, continental, sub-regional, national

and local), little success has been registered thus far in streamlining socio-economic development programmes and projects into comprehensive climate change response strategies and policies for adaptation and mitigation.²² Since the late 1990s, the concept and viable practice of smart urban growth has been increasingly referred to within the regional and local development planning fraternity. The smart growth concept is particularly relevant in attempts to counter the adverse externalities emerging from increasing urbanisation across the globe. The concept instils a change in spatial planning culture towards more compact, environmentally-friendly urban design and urbanism.

Given the succession, over the last 30 years, of regional and local economic planning models promoting alternative forms of development, there is mounting discourse on climate smart growth initiatives and their positive environmental, financial and quality of life effects on urbanisation. In most cases, however, these achievements have been minimal as the current trends are failing particularly due to weak governance.²³ This paper seeks to discuss the concept of climate-smart urban growth and provide some insight into the current debate that seeks to address the growing evidence of increasing vulnerability to climate change impacts in many of the world's urbanised economies. The circumstances that account for the persistence of environmentally wasteful urban sprawl and other resource-intensive life patterns will be examined, to determine the missing link in the attainment of the much desired smart growth concept.²⁴

It is widely agreed among policy makers, development experts and scientists, that cities are a vital agent in climate change mitigation efforts. The International Energy Agency (IEA) estimates that urban areas account for a 71 per cent share of global energy-related carbon emissions. Given the projected trend in urbanisation, this percentage is anticipated to grow to even higher levels.²⁵ In support of this assertion, the UN estimates that, by 2050, the world's urban population will have grown from 3.4 billion to 6.3 billion, and this represents most of the global population growth over this period.²⁶ The greatest opportunity offered by urban centres is that they constitute centres of wealth and innovation that can potentially be invested into tackling climate change challenges when put to good use.²⁷

While the potential role of cities in enhancing climate change mitigation is well acknowledged, it is ironic that they are potentially vulnerable to climate change induced risks and resulting disasters, especially as a result of their preferred geographical sites, i.e. along coasts or riverbanks.^{28,29} For example, an increase in sea level and large storm surges will threaten crucial urban infrastructure. More frequent and intense floods and droughts will put increased demand on essential and often scarce water supplies. Climate change related stresses are anticipated to exacerbate urban pressures of rapid population growth and sprawl, and poverty and pollution. The situation is made even worse due to the dominant process of urbanisation of poverty, implying an increasing influx of mostly the poor, hungry, sick and unskilled rural immigrants. There will also be other knock-on effects, because of the concentrated and integrated economic activity, highly complex infrastructure systems and social services, and poor governance in cities.³⁰

Some cities have recorded significant success with climate-smart development initiatives and New York is among such urban centres. New York has won considerable recognition for its long-term growth and sustainability plan. The plan aims at reducing greenhouse gas (GHGs) emissions by 30 per cent from the 2005 level over the next 20 years – roughly the same as the US federal government's goal of reducing the country's emissions by 28 per cent from the 2005 level by 2020. As nearly 80 per cent of New York City (NYC) emissions come from buildings, the plan enforces a compulsory energy audit of city and commercial buildings larger than 4 645 square metres (50 000 square feet). The city authority has put in place a Climate Change Adaptation Task Force, composed of 40 public and private entities, that manages the city's essential energy, water, waste, natural resources, transportation and communications infrastructure.³¹ The NYC Panel on Climate Change, is there to provide early warning information to the task force, including projections on sea level rise (with and without rapid ice melt), as well as a framework for the development of the city's climate resilience planning effort. Among the key recommendations provided by the task force are to focus on an all-inclusive strategy and to promote climate-smart infrastructure, such as road drainage, developing green roofs and improving hazard event evacuation plans.³²

Climate change response policy efforts, at both global and local level, need to promote the active involvement of the scientific community, in order to provide new and timely information about how the changing climate will affect urban areas, including long-term changes to livelihoods, health and local economies.³³ In this regard, political leadership needs to be visionary in terms of climate-sensitive urban development planning. The carbon dioxide 'domes' that form over urban areas need to be better understood, so that local officials can measure and verify changes in local emissions.³⁴

The political and scientific community must ensure consensus in addressing important questions about how air pollution will interact with future temperatures to affect population health. Ecosystems³⁵ of cities need to be studied, including the role of green spaces as coolants and coastal wetlands as storm-surge buffers, as well as an understanding of the effect of climate change on urban disease vectors such as mosquitoes, rats and other pests. There is a need to collectively seek answers to questions about the combined effects of changing migration patterns and climate, and help in estimating resulting response costs – particularly for poorer people and other at-risk populations.

Cities³⁶ represent a significant opportunity to address climate change related challenges for four reasons. Firstly, they are centres for high consumption of energy that result in huge amounts of waste generation. In this regard, the influence of local authorities over such processes vary with national and local circumstances, but could include: energy supply and management, transport supply and demand, land use planning, building requirements and standards, waste management, and offering education and advice to local communities. The second reason is that since 1992, urban authorities have been engaging with issues of sustainable development and attempting to translate global rhetoric into local practice, through Local Agenda 21, in ways that potentially contribute

towards climate change mitigation. A third reason is that local authorities could facilitate action by others in response to climate change, through lobbying national governments as well as by developing centres of excellence to illuminate the costs and benefits of controlling GHG emissions. Lastly, local authorities have gathered enough experience in addressing environmental management issues (including energy management, transport and spatial planning), which has an impact on climate change mitigation.³⁷ There is need to employ a multi-level governance approach involving both the vertical and horizontal integration of structures across state and non-state boundaries.

The rapidly changing landscape of urban response to climate change and the growing academic literature in this field provides a positive outlook in terms of sustainable options for a climate-resilient future. As the climate change discourse continues to shape urban agendas, the utility of multi-level governance perspectives for understanding this phenomenon is being strengthened through the mutual exchange of ideas between researchers and policy makers who are seeking to identify a 'new' politics of urban climate change governance, and its consequent implications for the development of theory and practice in this field.

In highlighting the growing need for further collaboration in climate change science for sustainable urbanisation³⁸ observations have been made that while sustainable cities have been promoted as a desirable goal within a variety of policy contexts, critical questions remain unanswered concerning the extent to which cities and local governments can address the challenges of sustainability. A holistic and multi-level governance approach is required to guide societies and economies to follow a path towards the creation of sustainable cities. It is argued in this regard that the 'urban' governance of climate protection involves relations between levels of the state and new network spheres of authority that challenge traditional distinctions between local, national and global environmental politics. It is the purpose of this paper to explore the vertical and horizontal integration channels of governance that are possible, in order to guarantee environmentally sustainable climate resilient urban growth processes and patterns in Ethiopia.

PRESENTATION OF DATA AND DISCUSSION OF FINDINGS

Ethiopia's urban areas mostly grew naturally as indigenous urban settlements and expanded without much formal planning and control. Spontaneous urban growth subsequently emerged mostly through informal and often illegal developments that had little regard for environmental concerns.³⁹ Currently, Ethiopia's economy has been undergoing rapid growth at a double-digit rate. Alongside the economic growth momentum, urban centres in the country, particularly the primate capital, Addis Ababa, are undergoing rapid population and physical growth whose rates are increasingly outpacing the urban authorities' planning, fiscal, technical and institutional capacity to provide the basic infrastructure and services, including environmental management and associated

services.⁴⁰ According to the 1994 national census, the population of Addis Ababa was then 2.1 million; it increased to 2.7 million by the 2007 census (Commission, 2008). The city's urban growth rate is now 2.1 per cent; this is propelled by a huge influx of rural people to the typically primate city in search of better economic and other opportunities.⁴¹ The rapid migration thus adds to the existing burden on unemployment, housing, water supply, sanitation, poverty and a wide range of environmental and other services.

LAND USE IN AND AROUND ADDIS ABABA

Despite the various Master Plan attempts since about 1936,⁴² suggests that all of them tend to generally fail to go beyond the blue print. Addis Ababa has continued to exhibit largely spontaneous growth and the city's land has been subjected to continuous unplanned mixed use. The central and north eastern part of *Yeka* district, near the central bus station, and the south western margins of *Bole* district, exhibit extreme cases of unplanned sprawl, in terms of residential structures. As recently as 1994, Ethiopia had not developed a comprehensive general land use policy or a specific urban land use plan.⁴³ This is evidenced by several sections of the city mushrooming as residential compounds without sewer and water supply reticulation. With the exception of old buildings around *Piasa* and the stadium area, built during the brief Italian colonial era, the rest of the study area does not have sewerage reticulation. The best case scenario in the rest of the study area is some households with on-site septic tanks, with the remainder (almost 80 per cent of the built up area) using shallow pit latrines. Many different activities have been established indiscriminately and without impact assessments being done or authorisation obtained from the municipal government.⁴⁴ This includes: forest harvesting in the *Yeka* sub city's *Entoto* hills; stream bank cultivation in *Yeka*, *Bole*, and the *Akaki* industrial area; and sand digging and quarrying in the *Entoto* foothills, which host springs that serve as the main source of the *Akaki* River. All such activities are detrimental to the local ecohydrological system. Among the numerous activities proliferating in the city are some that generate complex waste material. These include: garages, car wash centres, petrol stations, tanneries, slaughterhouses, market centres, metal works and private clinics. These activities are wide-spread and mostly concentrated in the central business district of the stadium area, *Bole* sub-city and the *Akaki* industrial zone.

Residential areas – both the formally planned and slums – cohabit with churches, mosques, cemeteries, military camps, heavy industry, quarry sites, slaughter-houses, landfill sites and other socially incompatible land uses.⁴⁵ This land use mix has resulted in: conflict between land users, traffic gridlock, noise, pollution and other health risks. Government officials and residents alike share the same opinion, i.e. that this is acceptable and normal in Ethiopia and therefore there are no official complaints regarding the negative implications of such mixed land use. It is mostly foreigners who occasionally register their dissatisfaction regarding such mixed land use practices, particularly when

it involves livestock rearing or market places, and noise from churches, mosques and industry coexisting with residents. This land use mix has resulted in: conflict between land users, traffic gridlock, noise, pollution, and other health risks. The existing roads are of poor quality and are used by cars, pedestrians and herds and flocks of livestock. There is a general lack of environmental infrastructure and services in many residential and public areas and this has forced much of the population to dispose their waste (both solid and liquid) into nearby streams, storm drains and in open spaces. Findings of the study note that the roadside storm drains are invariably choked with sediment and garbage, including household waste water and septic tank spills.

The survey results show that the livelihoods of a significant proportion of the peri-urban and urban population in Addis Ababa are based on direct exploitation of land resources (soils, water, forest, livestock and fish). The ecosystem based livelihoods are mostly prevalent in the north-eastern and northern margins of the *Yeka* district, the western margins of *Bole* and the southern peripheries of *Aka* district. Local district authorities and NGOs operating in the districts concur that more than 50 per cent of household heads earn a living from timber extraction and sales, quarrying, gardening and livestock rearing in these urban peripheries. Due to a general lack of regulatory mechanisms to control access to and use of the resources, there are several sites in and around the city that are in a derelict state. The hilly terrain at the southern margin of the *Akaki* district is among the most degraded, as a result of a long history of indiscriminate quarrying by informal operators, which supply the booming construction industry in Addis Ababa. The Addis Ababa Environmental Protection Agency (AAEPA) concedes that it lacks the legal power to stop such operations; nor does it have the necessary political and legislative support to prosecute environmental offenders. Local communities are at the receiving end of such environmentally irresponsible production systems and livelihoods, as a result of the environmental, health and safety risks attributable to the unregulated mining activity.

This city is characterised by socially and environmentally incompatible industrial locations (in the midst of residential zones, on wetlands and along river banks). Almost all industries in Addis Ababa dispose of their waste into the air, on land and into rivers, without any treatment or concern for environmental health risks. This generates a complexity of neighbourhood environmental and health problems, mostly in the form of air, water and land pollution, which all constitute a real threat to human and animal health. Table 9.1 shows water pollution in Addis Ababa's aquatic resources.

Table 9.1: Environmental conditions/indicators of water quality in Addis Ababa

Indicators	Unit of measurement	Standard	Addis Ababa
<i>Industrial source pollution indicators</i>			
BOD	mg/l	80	4.475
COD	mg/l	250	14.702
Suspended Solids	mg/l	100	1.563
Treatment Plant	mg/l	0.5	4
Capital Chromium	mg/l	2	6
Non-point Source			
<i>Pollution indicators</i>			
BOD	mg/l	Clean water < 10	400
COD	mg/l	Clean water < 10	630
Suspended Solids	mg/l		575
<i>E. coli</i>	mpn/100ml	Clean water 1-2 mpn value	+30
Density of Public Parks	m2/capita	6	0.66
Change in Total Green Urea	ha	na	12%
Environmental Protection			
Expenditure			1% of GRDP

Source: UN Habitat⁴⁶

THE BUILT ENVIRONMENT

The remarkable physical transformation that Addis Ababa is currently undergoing in the form a growing number of high-rise and steel-and-glass commercial buildings gives a superficial image of a well-planned affluent urban environment. The new buildings instead shadow the reality that Addis Ababa has one of the highest densities of slum dwellers in the world. Indeed, 80 per cent of Addis Ababa's residents live in poverty-riddled slums that are widely spread throughout the city.⁴⁷ Official statistics from the city administration suggest that about 82 per cent of Addis Ababa's residents live in unplanned neighbourhoods, where more than 90 per cent of the excreta disposal is done via dry latrines and open fields/ditches and streams. Most housing units are constructed with low-quality materials that are inappropriate for health, safety and privacy, and they are often over-crowded, which makes them prone to fire accidents. The unplanned settlements are mostly inaccessible to roads, waste collection, firefighting, ambulances and other vital services.

The ever-increasing population in Addis Ababa is fuelling a crippling shortage of housing, with the deficit in housing for 2010 alone being 300 000.⁴⁸ The AACA Housing office suggests that almost 80 per cent of the real estate in Addis Ababa is purchased by a small proportion of local high-income residents and Ethiopians from the diaspora,

which marginalises the majority low income residents into chronic homelessness. The UN Habitat office in Addis Ababa estimates that about 82 per cent of Addis Ababa's residents live in unplanned neighbourhoods, where more than 90 per cent of the excreta disposal is via dry latrines and open fields/ditches and streams.

In terms of sanitation infrastructure, there is some sewerage network, but it is confined to the old French-built section of the city centre, with barely three per cent of the urban residents being served. In the absence of sewerage reticulation in greater Addis Ababa, the most feasible sanitation disposal options are pit latrines and open drain waste water infrastructure, which serves about 75 per cent of the population. A small proportion of the population (roughly 15 per cent) has access to septic tankflush toilets, which likewise often discharge to open drains, and with a significant minority (about 5 per cent) resorting to open defecation. Table 9.2 shows sanitation options used by Addis Ababa households. According to the Wastewater Master Plan,⁴⁹ the conventional sewer reticulation comprises about 30 km of trunk sewer and 90 km of secondary sewers, which serve about 40 000 people via 1 800 connections.⁵⁰ The state of sanitation in Addis Ababa is unsustainable, not only from the spatial and demographic coverage point of view, but also from a design point of view.

Table 9.2: Type of latrines accessible to local households in Yeka.

Type of Latrines	Frequency	Percentage Occurrence
Water-flush	11	5.6
Dry pit	104	63
Traditional pit	32	26.4
No toilet	43	5

Source: Field survey⁵¹

Of the limited sanitation coverage in Addis Ababa, it is mostly the traditional sanitation methods that dominate existing sanitation technology. The sewer system only covers roughly 10 per cent of the city and is very old, with a high rate of blockages and leakages. Given the pressing need for action to meet the MDG sanitation target, Addis Ababa among other primate capitals of Africa, has been struggling to increase sanitation coverage through the provision of low cost pit latrines. While the efforts are commendable, the challenge with this particular low cost sanitation design is that it is characterised by end of pipe sanitary thinking which remains unsustainable. Roughly 63 per cent of the population in Addis Ababa use dry pit latrines, with 26.4 per cent using septic tanks. Both cases are considered as on-site sanitation systems whose design is based on the premise that excreta is waste that simply must be disposed of. The practice is based on an unfortunate traditional assumption that the environment can always assimilate this waste. This assumption leads to a linear flow of resources and waste and often causes severe environmental pollution, especially given the commonly unmet waste treatment

requirement. It can be safely concluded that the technological innovations that were originally designed to solve the sanitation problem have, in many cases, become a source of major environmental health problems affecting Addis Ababa and many other metropolitan areas in the south. The system characteristically allows nutrients and pathogens to infiltrate and contaminate water sources, which poses a significant health risk to local and downstream communities. In addition to the above coverage and design drawbacks, the sanitation facilities are generally not socially acceptable, as they compromise human dignity, particularly from the perspective of women and the girl child.⁵²

URBAN SOLID WASTE MANAGEMENT

In terms of solid waste management (SWM), the Addis Ababa City Administration Waste Management Office claims that the city's estimated daily waste generation rate is 5 700 m³, while the daily collection rate is 2 880 m³. This implies that only about 40 per cent is collected.⁵³ With regard to financial, technical and human resources commitment, Addis Ababa City Administration gives little attention to waste management. In terms of level of commitment to waste collection, Addis Ababa commits only one per cent of its total Gross Local Domestic Product to environmental protection. The SWM burden is consequently left to the community. Most of the residential areas have communal waste disposal/collection/transfer points. These sites are characterised by overspilling of rotting garbage in neighbourhoods.

The collection points are not properly designed to mitigate potential environmental health risks such as leaching, runoff and exposure to the elements, which in turn generates bad smell, unsightly conditions, and infestation of flies, mosquitoes, rodents, and concentration of animals (both domestic and wild). It is worth noting that it is up to individual households to choose whether to secure the waste collection service or not. This voluntary scenario has seen the large majority (95 per cent) of residents not subscribing to the waste collection service for one reason or another. The results from the household survey suggest that over 90 per cent of households are not paying for the waste collection service and the reasons are as follows: about 80 per cent of households are not connected to water supply reticulation, which is the basis for the city's household register commonly used in the city administration's revenue collection system; and 60 per cent of respondents are not willing to pay for a service that is either erratic or non-existent in many instances. Also, among other reasons, 45 per cent of local households have no access to roads that are usable by waste collection vehicles. This undermines the financial sustainability and viability of the waste management system. Residents therefore chose to do the disposal of waste by themselves, either diligently taking the waste to the transfer point, or resorting to illegal and indiscriminate dumping of their garbage in open spaces, roadside, ditches, forests and streams.

Among other sustainability concerns, the issue of social equity is significantly compromised by the state and practice of waste management in Addis Ababa. Throughout Addis Ababa, the urban poor suffer most from the life threatening conditions derived from deficient SWM.⁵⁴ Municipalities tend to allocate their limited resources to the richer areas of higher tax yields where citizens with more political and financial power reside. Usually, wealthy residents use part of their income to avoid direct exposure to the environmental problems close to home, and the problems are shifted away from their neighbourhoods to elsewhere.

In terms of municipal waste disposal, Addis Ababa has one single formally designated municipal dump site for the entire city and some towns in *Oromia*. Various actors, both municipal and private, dump their waste at this landfill. On average, 55 trucks offload waste at the site per day. It is important to note that there is no system in place to record and charge the waste generators and trucks offloading waste at the landfill, let alone taking scrutiny of the nature and composition of the waste being dumped. The dumping of waste by individual operators is done free of charge, in order to encourage operators to bring their waste to the site, but this means there is no cost recovery on the management operations that are required on the landfill (tipping and levelling). This undermines the sustainability and possibility of improvement of the disposal site's management and treatment system.

The dump site is subjected to significant leachate seepage and run-off leading into the nearby streams and underground water sources. The survey has noted that there is neither control nor monitoring of waste dumped on site. Much of the hazardous waste generated from small- and large-scale industrial enterprises invariably finds its way either to the unsecured dump site or into the city's waterways and open spaces.

WATER RESOURCES MANAGEMENT AND SUPPLY SERVICES

Water resources management and supply system are one area in the public service that calls for visionary leadership and a well-established institutional and regulatory control. The water supply implementation challenges are particularly insurmountable in the fast-growing urban centres of developing nations such as Addis Ababa. It is argued that these challenges are entrenched within the broader sociopolitical framework, yet often unsuccessfully addressed within the narrower scope of improving technical knowledge and design capacity. During its long history of existence, Addis Ababa has been unable to provide enough and safe drinking water to a large proportion of its residents.

The 90 per cent official figure of water supply coverage that the Addis Ababa Water and Sanitation Agency (AAWSA) claims to have attained is disputed by stakeholders and city residents. In dispute to the official water supply coverage position stakeholders have raised a number of questions which are as follows: whether having water supply every few hours per day; having water supply on only one day of the week; and maybe

having a water tap on site is what the water authority implies with the said coverage? The dominant form of water supply in many city neighbourhoods is through community water taps which according to the distribution plan, should be one tap allocated to an average of 50 households, but findings from the surveyed residential areas have noted water users per each communal tap exceeding 500 households especially given the high tenant occupancy levels on both formal and informal housing units. The other question some residents therefore ask is whether having to wait one to four hours in a queue to fill one's water container is what this coverage implies?

The water supply coverage claims made by the AAWSA contrast significantly with data obtained from UN Habitat Addis Ababa office. According to the UN Habitat office, the water supply level in Addis Ababa falls far short of demand. Just about 50 per cent of the household water demand is unmet and only 26.8 per cent of the city households have water supply connections to their houses, while 45.3 per cent of the households in the city obtain their water from outside the compound or from water vendors. What is most unsustainable, is that low income households are the ones who suffer the most water scarcity and are therefore the most lucrative target market for water vendors, who charge 2 birr (approximately US\$1) per 20 litres, whereas high income households with minimal water supply disruptions on their household connections pay an average of 8 birr (approximately US\$4) for the whole month of unlimited consumption.

Residents therefore accuse water authorities of exhibiting denial to their grossly poor performance in water supply infrastructure and service delivery thus making the prospects for improvement very slim. This is a sign of lack of good governance, which is supposed to be an important administrative tool in planning and public service delivery. As such, the scenario is contradictory to the Ethiopian Water Resources Management Proclamation and the Water Sector Strategy, which claims to provide an efficient, optimum and equitable allocation of safe water for sustainable economic development on a sustainable basis.⁵⁵

Given its natural hydrological endowment, Ethiopia has enormous water resources, which are estimated to be capable of providing well beyond its water supply, food production, energy and export requirements.⁵⁶ Nevertheless, the use of the water resources to meet the socio-economic needs of the nation is very limited, due to various constraints. A number of challenges have been noted to constrain the water supply performance in Addis Ababa, including:

- the lack of an integrated approach to WRM and municipal supply due to limited resources;
- poor land use planning and the prevalence of spontaneous urban growth;
- population increase and the increasing intensification of commercial and industrial activities in neighbourhoods with limited water supply volumes; and

- fragmented sector-based provision of infrastructure and services with each sector such as; the telecommunication infrastructure provider, power supply authority, road and water corporations.

The planning process and provision of infrastructure by these sectoral entities is typically uncoordinated and fragmented whereby, as one erects their supply lines, there is disruption or damage of the other entity's infrastructure and water supply reticulation is among the most vulnerable due to its structural fragility. Burst water pipes at civil works are a common scenario throughout the city and repair response to such events can take several days, while local and downstream neighbourhoods suffer water shortages.

One major issue is the poor management of water resources in their natural occurrence. There is a lack of a basin-wide, integrated approach to water resources management. Due to the federal system that is in place in Ethiopia, some drainage basins traverse different regional states and there is no coordinated framework between the states in terms of water resources utilisation, conservation and management. This particular case of state-based fragmentation of water resources utilisation and management clearly manifests on the water sources for Addis Ababa. The *Lagadadi* Dam in particular is one major source of water for Addis Ababa. Both the dam and its entire catchment area are located in the rural *Oromoia* region. The catchment area is densely peopled and intensely cultivated. Besides the general tradition of over-stocking and over-grazing, the farming techniques employed are commonly traditional, with poor forest, soil and water conservation practices. The greater part of the catchment area is consequently heavily degraded, with large scale deforestation, and soil and gully erosion.

Due to the economic and environmental conditions of the *Lagadadi* catchment area, which is beyond the administrative and management control of Addis Ababa, the dam is heavily silted. The siltation is so heavy that the water treatment works on site are constantly choked with silt, making the whole water treatment system exceedingly expensive, with frequent breakdowns particularly due to the raw water's heavy sediment load. Given the poor state of water resources management – from source to consumer – Addis Ababa's vulnerability to insecurity is increasing, in terms of both quantity and quality.⁵⁷

The increasing share of underground water resources in the water supply system is due to the fact that the surface water options are increasingly getting heavily degraded and polluted and so too expensive to manage. In this regard, informed stakeholders have noted with concern that in light of the fast growing urban population and economy, why surface water dam projects already planned for (the *Sibilu* and *Gerbi* projects), are not being developed?

CLIMATE CHANGE CONSTRAINTS TO URBAN DEVELOPMENT IN ETHIOPIA

While Ethiopia is widely regarded as an African success story when it comes to economic growth, there are concerns that climate change could jeopardise its growth and development prospects. The impacts of global warming, rising surface temperatures and extreme weather are already being felt in Ethiopia. The changing climate is increasing the risk associated with extremes, such as the increased frequency and severity of heat waves, floods and drought. It will also make poverty reduction more difficult and decrease food and job security. The economic impacts of climate change in Ethiopia are already significant, mostly because the national and local economies are less able to adapt to changes affecting industry and jobs, with roughly 90 per cent of Ethiopia's population still heavily reliant on agriculture for a living.

The country has an estimated 70 million smallholder farmers, many of whom only grow sufficient crops of staples such as grain and coffee to support their families. In terms of urban employment, about 80 per cent of industry in Ethiopia is agro-based and so climate-sensitive, that is dominated by leather industry, food processing, breweries, textile, timber processing and agricultural marketing. With the changing climate, at the current rate, Ethiopia's urban population is likely to suffer increased job insecurity, unemployment and poverty, with about 70 per cent of the urban population currently engaged in the low paying informal sector.

In macroeconomic terms, coffee production is dominated by smallholder farmers and commands the single largest share of export earnings. The Ministry of Trade and Commerce indicated that coffee is worth about 800 million dollars at the moment; under the government's plan for economic growth it is set to grow to 1.6 billion dollars by 2025. The ravaging climate change is however likely to adversely undermine this projection if temperatures rise sufficiently to damage crops like coffee which thrives well in cool mountain conditions. Ethiopia will also likely face increased climate change linked disease burdens, such as the spread of malaria, rift valley fever, meningitis and malnutrition. Other sectors already recording the negative impacts of climate change include:

- The energy sector – changes in demand levels have been experienced, especially on account of weakened hydroelectricity supply due to changes in river flow and lake level.
- The transport sector has experienced some physical damage to existing infrastructure and an increase in the maintenance cost of roads, railways, airports and pipelines.
- In the water and sanitation sector, the warming climate has influenced changes in water quantity and quality and a significant rise in demand of, competition for, and conflict over the dwindling water resources.

- The housing and settlements sector has begun experiencing increased frequency and gravity with physical damage to existing settlements caused by catastrophic weather events such as floods, drought, wind storms, lightning and fires.
- The industrial sector has been recording a progressive decline in domestic production over the past few decades, coupled with worsening terms of trade and negative balance of payment.

In cognisance of the difficult task at hand to build a much desired middle-income society that is both sustainable and climate-resilient, the Government of Ethiopia launched the Climate Resilient Green Economy (CRGE) initiative, producing the CRGE Vision in 2011. This initiative comprises a strategy for climate resilient development and another to promote a green economy, altogether seeking to enhance resilience to climate change impacts and develop capacity to effectively contribute towards climate change mitigation, as well as fostering both economic development and reduced carbon dependent growth. Ethiopia is one of the few countries to have formally merged its aims of developing a green economy and greater resilience to climate change under a single policy framework, in support of its national development objectives.

In order to operationalise the CRGE, the government of Ethiopia has since created a Climate Resilient Green Fund, which is a step in the right direction, but huge challenges remain. A government body – the Agricultural Transformation Agency (ATA) – was set up to help make the country's agriculture industry more resilient to challenges like climate change. In terms of prospects for the effective implementation of the CRGE, government officials and local development partners appreciate the huge challenges ahead. According to an ATA official, the country's climate change strategy calls for annual spending of 7.5 billion dollars to combat the effects of climate change, but the actual funding available falls well short of this, at about 440 million dollars per year. Given the agro-based nature of Ethiopia's economy, both rural and urban, climate change is bound to exacerbate poverty and the food security problem for the vast majority of Ethiopians, besides exerting increased pressure on the overall national economic well-being. The low level of economic development, combined with a heavy dependence on rain-fed agriculture and high population growth, make Ethiopia particularly vulnerable to the adverse impacts of climate change. Intense pressure on the country's soil, water and biodiversity resources add to the national challenge of responding to climate change. Climate change, therefore, has the potential to hold back economic progress, or reverse the gains made in terms of development and could exacerbate social and economic problems, particularly in the face of the physical, financial, technical and social constraints to effective implementation of the climate change response policy, strategies and plans.

Among the most striking achievements in Ethiopia's CRGE initiatives is the introduction of modern and energy-efficient urban transport modes and technologies, including light rail and a bus rapid transit system in Addis Ababa. The light rail system was opened for commercial operations in September 2015. It is designed to relieve the growing road

congestion, as the city's population passes five million inhabitants. The rail system consists of a 34 km two-line network serving 39 stations. It has been constructed at an estimated cost of US\$475 million, which is a significant commitment by Ethiopian standards. The light rail is already yielding benefits to government, city administration, business, local residents and the environment, which is a sure measure of equity. Benefits include: traffic congestion and accidents have been reduced significantly; there is a reduced rate of employee late arrival at work in the city; centralised and well-coordinated revenue collection from the urban transport industry; improved pedestrian safety and convenience; commuter safety and health; and, importantly, significantly reduced noise and air pollution in the city environs. The government of Ethiopia has been rated highly the world with regards to the prospects for small economies to significantly contribute towards climate change mitigation and improved human health and well-being in cities.

INSTITUTIONAL CONSTRAINTS TO ENVIRONMENTALLY COMPATIBLE ECONOMIC GROWTH

While human activities are the direct culprits of the deteriorating environmental quality in Addis Ababa and elsewhere in the country, it is human 'inactivity', in the form of environmental management gaps, that is most to blame. While economic analysts are generally impressed by deliverables emerging from Ethiopia's developmental policy for accelerated government driven economic growth and development, environmental degradation, at both local and national level is among the most worrisome externalities.

In order for the country and society to escape the vicious cycle of underdevelopment and poverty that has been characteristic over the past several decades, the government of Ethiopia has committed itself to lead through a developmental democratic policy. The government envisions transforming the country through massive industrial development to boost its investment competitiveness and level of industrialisation in a relatively short period of time. Ethiopia's remarkable economic performance has fuelled investment interest in the manufacturing and other industrial sectors, mostly based on an unprecedented appetite for natural resources as source of revenue and raw materials to sustain the double digit economic growth momentum. Yet the institutional capacity of the economy, in terms of planning, implementing, following-up and administering infrastructure projects, remains underdeveloped. The problem is not with the accelerated economic development ambitions per se, but rather has to do with the capacity to realise them in the most efficient way possible. There remains a significant degree of inefficiency within the system and this is noticeable through the government's short-sighted obsession with generating economic growth at the expense of environmental stewardship and, in many cases, social justice.

Among the key indicators of such environmental management gaps in Ethiopia's thrust for economic growth, the country's state of the environment is under increasing

threat of further degradation. The government that is leading in the developmental drive is largely to blame for the deteriorating state of the environment, either due to its actions or its inaction. There is no systematic monitoring system of water and other resources at both national and local level. For instance, the relationship between aquatic ecosystems and the livelihoods of beneficiary and downstream communities, such as farmers, fishermen, and urban water consumers, is yet to be comprehensively assessed, and thus monitoring in this regard is almost non-existent.

There is a general absence of policies and regulation of forest and water resources use for both rural and urban land use activities. For a long time, Ethiopia has been struggling to implement sound water use policies and legislation directed toward long term conservation. Even some of the most hydro-ecologically important rift valley lakes that the country is endowed with, and supposedly regarded as protected under the national parks, had been significantly encroached on and indiscriminately exploited by both rural and urban communities.⁵⁸

Although the Ethiopian government has fairly recently approved legislation on environmental protection, with the Environmental Protection Authority (EPA) being established, no actions that warrant protection of the major environmental assets such as forests and lakes have been taken as yet. There are federal policies to support the environmental protection proclamation, including: water conservation; fisheries protection; Environmental Protection Policy;⁵⁹ Environmental Impact Assessment; and a pollution act. Among the various implementing agents for natural resources protection, there is significant fragmentation of policies while in other cases there is gross duplication and conflicts of roles and responsibilities among them resulting in a chronically dysfunctional institutional framework.

Although there are some regulations and policies, such as the environmental policy and the water utilisation policy, there is a major lack of institutional capacity to set out and enforce strict rules and guidelines for effective implementation. Generally, the implementing agents lack the requisite legal powers to confront, convict and even penalise offenders. Neither do they have powers to enforce critical laws, such as EIA, pollution control and waste management. A combination of intervening interests ranging from political to economic, leave most implementing and enforcement agents powerless.

There is a significant lack of political will to channel the necessary support (legislative, technical and financial) towards capacity building of the implementing natural resources management institutions. Given the federal nature of government and governance in Ethiopia, while the EPA is well established at Federal level, it is yet to build the requisite capacity and authority of environmental protection institutions at regional level. Regarding the management of national water resources, the framework in place is region-based, rather than catchment-based, which creates conflict that is detrimental to the state of national water and other resources.

In addition to the region-based conflicts around water resources management, development programmes and projects in key drainage basins of the country have been

sectoral and haphazard with a gross lack of integration and environmental considerations. Farming, mining and various urban land use activities freely access, use, and in many cases, abuse environmental assets that should otherwise be protected. In this regard, there is a high proliferation and expansion of farming, industrial, commercial and domestic activities onto riverbanks, forests, wetlands and the lakeshores with far reaching environmental externalities.

The other challenge that exacerbates the potential ethnic conflict arising from attempts to enforce water and other natural resources legislation is the fact that administrative units in Ethiopia are demarcated according to ethnic lines, rather than catchment-based considerations. As a result, catchment-wide attempts at natural resources management are perennially frustrated by antagonistic ethnic interests in a single drainage basin.

Regarding the role and powers of the EPA, one recent sad development has been instituted to the detriment of environmental sustainability, i.e. the newly proclaimed investment proclamation supersedes the EIA proclamation.⁶⁰ This is clear evidence of government's lack of sincerity and commitment to protect national and local environmental assets. It shows clearly the government's obsession with attracting and promoting economic investment at the expense of environmental sustainability.⁶¹

CONCLUSION

Despite a progressive build-up of evidence on the degradation trends of Ethiopia's national and local environments, the environmental management gaps remain persistent till today. The management gaps emanate from the federal and regional governments' inaction regarding the need to establish comprehensive water and other natural resources management strategies. A combination of unregulated access and use of vital ecosystem products, coupled with weak institutional capacity for catchment-wide management of forests and other land resources, can be attributed to the continued depletion of key environmental resources in Ethiopia. In the face of changing climate, the growing population pressure and intensified land use on ecosystems call for immediate and firm actions to be taken to change the present approach of natural resources utilisation and management. Unless corrective measures are taken based on a basin-wide integrated drainage approach to water and related resources management and conservation, far-reaching environmental and socio-economic crises would be inevitable in and around Addis Ababa. At local level, local authorities and communities are using unsustainable resource management approaches to boost economic growth, employment creation, food security, and poverty alleviation and in the process, generating adverse eco-hydrological and other environmental externalities. In the face of the raging climate change risks, all stakeholders ranging from government, through to business and the community in general are engaged in mal-adaptation to climate change impacts. This will exacerbate the vulnerability of business, livelihoods, national and local economies to climate change

impacts in the long run. The study concludes that there is still a major constraint in terms of the required political will and institutional capacity towards the much desired decoupling of environmental degradation with economic growth. The paper concludes that green growth will not ensure sustainable economic development as long as environmental degradation continues to generate worsening problems of ecological scarcity – the loss of myriad ecosystem goods and services at the mercy of irresponsible human use and activity. Overcoming this problem requires structural transformations towards green investment policies and related production and consumption patterns and climate-smart livelihoods for the majority citizens. The sustainability challenge is to overcome a vast array of market, policy and institutional failures that prevent recognition of the economic significance of environmental degradation. In the face of anthropogenic climate change, the vicious cycle linking poor governance, unsustainable economic growth strategies and community livelihoods must be broken, in order to put Ethiopia on a sustainable and climate resilient urban development path.

While a host of challenges relating to Ethiopia's environmentally sustainable and climate-smart urban development initiatives have been presented and discussed, it is important to also note that the case study unveils prospects for struggling economies to follow a green growth economy path. Despite a complex mix of challenges, Ethiopia has begun to take serious steps in formulating and adopting climate-smart development policies in response to the vagaries of climate change. The formulation of CRGE Strategy in 2011 represents a major step forward in terms of the country's commitment to building a green and climate-smart society and economy. This low-carbon development strategy will, however, require enormous financial support, which Ethiopia and other Sub-Saharan African countries cannot afford. This calls for development partners and international organisations to fill the financing gap to ensure climate resilient African economies.

RECOMMENDATIONS

Among the ingredients of good development policies, is a mechanism to deal with uncertainty and ignorance that are key allies to environmental degradation and addressing these is a key requirement in decoupling environmental degradation with economic growth. There is an increasing need for a market-friendly approach to development with the following components: improved climate for enterprise integration into the global economy and investment in the human capital development in the context of sustainability.

Society and policy makers are becoming increasingly aware that the management of sustainability objectives and economic policy are becoming more closely connected and finding solutions require the involvement of many/all stakeholders and a mix of various environmental management instruments. The regulation approach is only one approach and it has, in many circumstances, proven that it is not always the best. The failure of the command and control approach as evidenced in Addis Ababa and elsewhere, and calls

for the exploration and application of economic instruments as an option to enhance environmental sustainability.⁶²

Economic instruments affect decisions, budgets, household and community behaviour, and management of enterprises by attaching economic incentives and disincentives to elements of behaviour.⁶³ Ethiopia needs to pay attention to this emerging opportunity for possible application towards green economy transitioning.

Carbon emissions, environmental degradation, resource depletion, land, water and air pollution, public health concerns and demographic changes are all issues in which there is a cross-over between economic and public policy and as such, economic instruments are to be considered as an important approach to achieve green economy policy objectives for Ethiopia without the need for hard regulations.⁶⁴ They help to achieve policy objectives by changing to more sustainable and/or responsible behaviour (both at household and corporate level) and discouraging excessive use of resources and waste generation while stimulating cost-saving innovations and behaviour for continuous environmental performance among government institutions, the business community and citizens at large.

There is increased demand for more restrictive protection of the environment based on upholding the fundamental right to an 'ecologically balanced environment', which demands special protection. One of the mechanisms used to accomplish effective environmental conservation is the permit system for the authorisation of certain activities such as construction, installation, expansion or operation of any activity that uses environmental resources or is considered to be actually or potentially damaging to the environment such as most industrial operations in Ethiopia.⁶⁵ Each of these permits sets a package of conditions that the entrepreneur must respect in the planning, implementation and closure of the project. Thus, all of the final operational permit requirements must be respected during the entire operation, and failure to fulfil these conditions may trigger administrative, civil and criminal liability, which will be subject to various penalties (ranging from a simple fine to indemnification, suspension of activities and imprisonment).⁶⁶ While the Ethiopian Environmental Policy has such provisions, evidence on the ground suggests a glaring lack of enforcement and also that, even if the current provisions were enforced, they are not punitive enough to control the irresponsible practices and behaviour of environmental offenders.

The Addis Ababa City Administration needs to learn that water quality permits are effective in protecting local and downstream water quality and associated aquatic systems. According to Sahin,⁶⁷ local populations are entitled to clean water and so should be upheld by state laws and regulations, including the Water Pollution Control Act. It claims to '...maintain the highest possible standards to ensure the purity of all waters of the state consistent with public health and public enjoyment ... the propagation and protection of wildlife, birds, game, fish and other aquatic life, and the industrial development of the state'. In general, the discharge of any wastewater, except domestic wastewater going to a municipal treatment plant, requires a wastewater discharge permit. This includes storm water from industrial and construction sites, including from municipal operations.⁶⁸

The Ethiopian government and the city administration should realise that economic development and sound environmental management are complimentary aspects of the same agenda for a green economy. Without adequate environmental protection, development will be undermined; without development, environmental protection will, in turn, fail. Economic growth is essential for sustained poverty reduction, but that is only with effective policies and institutions that will see economic growth and income increase providing the resources for improved environmental protection and management. This is a case of win-win policies to improve economic efficiency and to reduce environmental damage at no net financial cost to government. Such an ambitious outcome can only be achieved, for example, through the removal of subsidies for resource/energy use and clarifying property rights.

Environmentally sensitive taxes, permits, charges, penalties and incentives, among others, will complete the market based package of local environmental management particularly targeting polluting and forest resource dependent activities. Importing of petrochemical based products and other specified goods should invite significant duty, on the basis of the potential environmental and health implications associated with these products. Significant charges and or tax should also be administered on the local production, supply and consumption of such environmentally unfriendly goods and services, so that the end product is priced in recognition of the externalities arising from them. Realistic pricing of fossil fuels and plastic bags, for example, could generate positive synergies leading to reduced consumption, supply and production, all to the benefit of green growth transitional strategies. It would also entail a strong incentive for plastic waste reduction, reuse and recycling, which would translate into economic, social, and environmental benefits associated with integrated SWM.

The application of user charges should be considered from the general economic principle of cost recovery.⁶⁹ The water supply and sanitation challenges affecting much of the city sections and being the major local cause of disease and death could only be effectively solved by putting into effect the aspect of economic viability. Investing in water supply is a sample experiment for environmental sustainability. When prices are not available, consumer choices can be used to value benefits derived from water supply and sanitation, among other environmental infrastructure. In developed countries, consumers pay all the recurrent costs of both water and sewage services, but this would not apply to less developed countries, due to the high levels of poverty among urban residents. The prevailing financial, technical and human resources challenges dogging the SWM system in Ethiopian cities can only be solved by creating a sustainable cost recovery system involving the community's (beneficiaries) financial commitment to paying economically sensible tariffs. The internal cash generation as a result account for only a small percentage of project cost. This financial distortion in Third World cities is ironical in the sense that there is abundant evidence that most urban families are willing to pay substantial amounts for safe and reliable water supply and the removal of excreta and waste water from their homes.

Addis Ababa should explore the economic initiative of separating service provision from regulation. The central problem in improving environmental quality is that the public sector acts both as the supplier of water and waste water services and as the environmental regulator. This generates conflict of interest whereby prosecutions for those responsible for water resource pollution become rare, when an authority such as AAWSA is responsible for the water resource management, environmental protection and services. If the private sector is given the supply role, the state will effectively remain a regulator, which must come up with economically sensible fines, charges, taxes and prosecutions and violators can be made accountable for their action.⁷⁰

The issue of property rights is important in solving the dilemma of the commons undermining the local common property resources such as water and forests.⁷¹ The idea is not targeted at private ownership per se, but there is simple need for the clear definition of responsibilities for the control and protection of the resources so as to administer some kind of control of access to and use of the resource. Ethiopia's beautiful lakes, forests and wildlife are in desperate need, which suggests exploring this option is advisable. There is already an initiative towards community ownership of forest resources in the country, which has been motivated by the emergent principle of carbon trading. The global market for carbon has offered forest dependent communities direct financial, social and environmental benefits, while reducing GHG concentrations.

Regarding the role of the EPA in the national and local protection and management of the environmental resources, the lack of functional linkage between EPA and the relevant regional organs and sectoral organs must be addressed. There is need for leadership commitment, particularly the federal government to ensure that there is well established vertical integration and decentralisation of environmental authorities down the government hierarchies towards the local level. Efforts must be made for the realisation of this linkage, including revising the law to clearly set up a viable institutional link between EPA and other environmental management sectoral partners such as the energy, water authority, forest authority, agricultural, health and other climate-sensitive sectors for coordinated climate resilient development approaches, programs and projects.

Overcoming sustainability hurdles requires a multi-dimensional approach, including addressing the funding challenges that are chronic in Ethiopia and other developing nations. According to Barbier,⁷² the sustainability challenge is to be overcome through a vast array of market, policy and institutional failures that prevents recognition of the economic significance of poor environmental governance. The funding challenge is to bridge the shortfall between the global benefits that humankind receives from ecosystems and what we are willing to pay to maintain and conserve them. Improving economic and scientific analysis of ecological scarcity, valuing the loss in benefits, and translating the implications into policy, are the key steps in addressing the sustainability challenge. Exploring and implementing a range of innovative financing mechanisms, from international payments for ecosystem services and financial and currency transaction taxes to international financing facilities are possibilities for alleviating the funding challenge.⁷³

Political leadership together with local development partners must recognise that sustainable green growth it is inherently a part of sustainable development and as such, is a strategy of quality development, enabling countries to leapfrog old technologies in many sectors, including through the use of energy efficiency and clean technology.⁷⁴ To that end, there is a need to take steps to create, as appropriate, the enabling environments that are conducive to the development of energy efficiency and clean energy technologies, including policies and practices in our countries and beyond, including technical transfer from best practices and the requisite capacity building or local institutions and implementing agencies such as the Environmental Protection Authority of Ethiopia and other relevant organs. If government is to own up to its word and policy rhetoric of a green economy, it must reinstate the powers that the EIA proclamation deserves over the investment proclamation. The constitutionally guaranteed rights of the people to participate and to be consulted in any development activity that could affect them must be realised in its full sense, both during the EIA process, and during the review and environmental auditing process. There have to be incentive mechanisms provided by the government and other stakeholders to reward projects and businesses that excel in EIA and associated environmental management performance.

Finally, there is a need for an all-inclusive and systems approach for effective implementation of planned adaptation interventions as outlined in the national policy and strategy documents and to build resilience in urban growth and development, agriculture, natural resources and food security sectors. Also, further research is needed to fill in crucial knowledge gaps, some of which are identified and discussed in this chapter.

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An Analysis of Water Quality in Belvedere North and the Epworth Wetlands of Harare, Zimbabwe

Luke Mutisi and Godwell Nhamo

ABSTRACT

The aim of this study was to determine the extent of pollution in the Belvedere North and Epworth wetland areas in Harare, Zimbabwe. The objective was spelt out as follows: To determine the level of wetland water contamination in the study area, with a view to conserving such if evidence suggests there was degradation taking place. An analysis of water samples was done that focused on both the physical and chemical parameters. The physical parameters included temperature, pH, total dissolved solids (TDS), dissolved oxygen (DO) and conductivity. An onsite multimeter was used to analyse the physical parameters instantly. Further analysis of the parameters was carried out in the laboratory using the titrimetric, electrode and Atomic Absorption Spectroscopy (AAS) methods of analysis. The chemical parameters under study were salinity, total nitrogen and total phosphate. Sampling was carried out at four points along the Jacha River in Epworth and the Marimba River in Belvedere. The samples were collected upstream, midstream and downstream of the wetland area, but within a distance of one kilometre, with the aid of a handheld global positioning system (GPS) device. The sampling process was carried out in October 2013 (dry season) and in March 2014 (wet season). The key findings were that, whereas housing developments in Belvedere North are formal and planned, developments in Epworth are informal and haphazard. With no formal planning, the Epworth wetlands have been severely impacted by water and sand extraction as well as contamination of underground water by pit latrines that are common in these informal settlements. The study further revealed that water quality in Epworth is poor in comparison to that in the Belvedere North wetlands. Measures of dissolved oxygen, total dissolved substances and conductivity increased from October to March, in both study areas, which relates to the

rainy season. The study further found that ions increased significantly downstream of the wetlands.

INTRODUCTION

Wetlands are fragile ecosystems that deliver a wide range of environmental and ecosystem services that contribute to human well-being. This fragility has seen a number of wetlands succumb to degradation and loss arising from different causes. The positive contribution of wetlands to various ecosystems and the increasing rate of their degradation and loss has been a cause for concern to different stakeholders for a long time. Among the competing land uses resulting in wetlands loss and degradation, are urban agriculture, industrial development and housing.

Land use changes in the city of Harare, Zimbabwe has intensified since 2000, due to the demand for accommodation, office space and urban agriculture.¹ This research sought to understand the impact of land use changes, particularly housing and urban agriculture's encroachment into the City of Harare wetlands. The research also sought to raise awareness regarding the impact of wetland degradation among the general public and civil society organisations, so that they become aware of environmental challenges associated with anthropogenic wetlands degradation.²

Water quality standards have been set internationally. The quality of water differs in the wetlands of the world due to the different potential pollutants that they are subjected to.³ Chemical, biological and physical parameters vary with governments and organisations, depending on the need and the intended purpose. For instance, the United States of America (US) has a department that is responsible for the management of water quality standards – the Environmental Protection Agency (EPA). This department is responsible for setting the standards and for monitoring them. However, at an international level, the World Health Organisation has set standards that have been adopted by other nations of the world. Continual monitoring is critical to determine whether the water quality is improving or deteriorating.⁴

Physical parameters for surface water have been identified by governments. Surface water quality relates to physical parameters such as pH, temperature, salinity, TDS, dissolved oxygen, etc. These parameters simply prove the quality of water at any given time and in a given area.⁵ Limits have been set by different organisations for different parameters. For instance, there are acceptable values of pH between 6,5 and 7,5 that show the neutrality of the water. This value range shows minimal contamination of the water; if the value is above or below the acceptable value range, it is proof of a foreign component having been introduced.

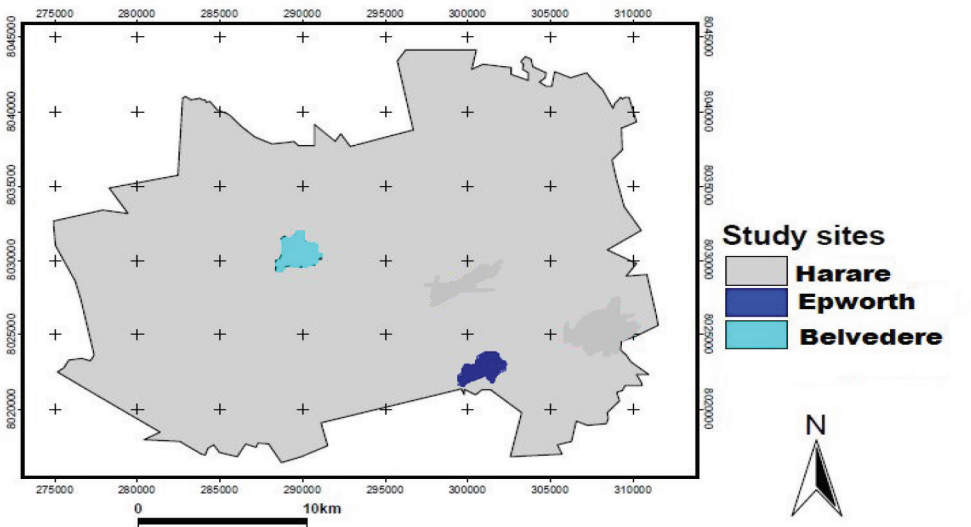
All parameters in question have acceptable and unacceptable values. Specific values have been set for different parameters, so as to ensure that governments are guided by the same standards. Surface and ground water chemistry differs with the activities

that occur. The presence of trace elements in either surface or ground water means that responsible departments will have to determine the source of the elements.⁶

METHODOLOGY AND STUDY AREA

The aim of this study was to determine the extent of pollution in the Belvedere North and Epworth wetland areas in Harare, Zimbabwe. The objective set was therefore to determine the levels of wetland water contamination. The study sites identified are indicated in Figure 10.1. To determine the extent of pollution, water samples were collected in the wetlands and submitted to the laboratory for analysis. The analysis of selected chemical and physical parameters was carried out by way of the following methods: AAS, turbidimetric, spectrophotometric and titrimetric.

Figure 10.1: Harare boundary map with study sites



Source: Authors⁷

Epworth is located south east of Harare. The settlement was established in 1892 by the Methodist Wesleyan Mission and named Epworth Farm. The Mission attracted recruited converts and by the year 1950, it had recruited about 500 families.⁸ The recruited families were all allocated land for cropping and residential purposes.⁹ The liberation war (1966-1979) saw an influx of several families into the Epworth area. The post-independence era saw the establishment of the Epworth Local Board (ELB) in 1986. At that time, there were approximately 5 000 residential stands that were formally allocated. The post-independence era saw further influx of people into the area, with the incoming families building

illegal structures as they needed a place to stay.¹⁰ This influx continued to such an extent that by 1997, there was an estimated population of 150 000.¹¹ However, despite the demolition of illegal structures, more people continued to settle in Epworth and by 2007, the Epworth population had risen to 300 000 people.¹² The spatial distribution of settlements in the seven wards of Epworth shows that the new settlers have occupied portions of sensitive zones. According to Chirisa,¹³ the occupants of these informal settlements are poor and their occupancy of the land is referred to as the ‘law of adverse possession’. This concept refers to instances where individuals occupy space without authorisation from the local authority.

In comparison, Belvedere is a formal, planned suburb that is strictly controlled by the local authority – the Harare City Council. Belvedere is a suburb located in the western areas of Harare and is served by a relatively well-functioning system in terms of infrastructure, when compared to Epworth. However, 2013 saw constructions that started creeping into the reserved area, most notably the construction of a shopping mall (Long Cheng Plaza) and residential properties that were all built on a wetland. In fact, the Ministry of Local Government, Public Works and National Housing engaged in a land deal exchange to swap the Belvedere Wetland area for a portion of state land elsewhere.

Sampling was carried out at four points on both rivers (Jacha River in Epworth and Marimba River in Belvedere) (Tables 10.1 and 10.2). The samples were collected upstream, midstream and downstream of the wetland area, but no more than one kilometre away, with the aid of a hand-held GPS device. Of the four selected sampling points, one was upstream of the wetland, two points were midstream of the wetland and the other was downstream of the wetland. The location of every sampling point was a maximum of one kilometre from the next.

Table 10.1: Belvedere North sampling sites

Coordinates (UTM)	X	Y
Upstream	288289	8028923
Midstream 1	288198	8028572
Midstream 2	288153	8028198
Downstream	288306	8029247

Source: Authors¹⁴

Table 10.2: Epworth sampling sites

Coordinates (UTM)	X	Y
Upstream	303302	8021091
Midstream 1	303255	8021495
Midstream 2	303408	8022100
Downstream	303186	8021786

Source: Authors¹⁵

The sampling process was carried out in October 2013 (dry season) and in March 2014 (wet season). In Zimbabwe, the month of October is considered to be the dry season because the rains have not yet arrived. In other words, the month of October is just before the rains fall, i.e. just before the beginning of summer. During this period, the river flows at a low rate and the wetlands area is less wet.

Analysis of the water samples focused on both the physical and chemical parameters of the samples. The physical parameters included temperature, pH, TDS, DO and conductivity. An onsite multimeter was used to instantly analyse physical parameters such as temperature, pH, TDS, DO and conductivity. These parameters were measured using a WTW 330i conductivity meter and a HACH pH meter.¹⁶ The chemical parameters under study were salinity, total nitrogen and total phosphate. Analysis of these parameters was carried out in the laboratory using the titrimetric, electrode and AAS methods of analysis. The samples were taken to the laboratory within a period of 24 hours.

Non-treatment methods were also employed, namely spectrophotometric and turbidimetric methods. The turbidimetric method was used for analysis of total phosphates, whilst the spectrophotometric method was used for analysis of total nitrates. However, salinity was analysed using the conductivity meter mentioned above.

The parameters were selected based on their cumulative effects on the quality of water in wetlands. All the parameters are commonly known as pollutants; due to the impacts they have on wetlands. According to Perry and Vanderklein,¹⁷ there are ten water quality impacts that emanate from different land uses, namely: salinisation, pH (acidification), change in flow of water, temperature, heavy metals, toxins such as herbicides, nutrient load, bacteria and viruses, organic matter and biological (and chemical) oxygen demand, and changes in suspended sediment load.

An example is the use of fertiliser by residents while undertaking urban agricultural activities. Fertiliser contributes highly to the phosphate, sulphate and nitrogen component of the water. In other words, these parameters depend on the land use, and with domestic related activities, salinity is likely to be expected, due to the salts used by residents in their day-to-day activities.

Water samples were collected at each different sample point by way of a water sampler. The water sampler had a sucking tube that collected water from the river. The water was then poured into a sterilised 500ml plastic bottle. This process is commonly known

as the ‘grab’ method of sampling. The samples were kept in labelled 500ml sterilised plastic bottles that were preserved under low pH. The water was collected at 5cm below water surface, so as to collect all possible pollutants flowing in the water. Samples were collected twice; in October 2013 (before the rains) and in March 2014 (after the rains). The water sampling point characteristics are shown in Table 10.3.

Table 10.3: Characteristics of the study sites

Wetland location	Characteristics
Belvedere North	• The wetland area is seasonally wet. • A Chinese Mall was built on the wetland. • The prevailing soils are expansive clayey soils. • Riparian vegetation is more pronounced in the wetland area, with <i>Typha latifolia</i> in most sections. • A stream flows perennially from Monavale towards Kambuzuma. • Urban agriculture also occurs in the wetland in the summer season.
Epworth	• The wetland is seasonally wet. • Informal dwellings already exist in the wetland. • The prevailing soils are largely silt to clay in nature. • Riparian vegetation is more pronounced in the wetland, with reeds dominating the wetland. • The stream flows seasonally and fully submerges the wetland area in summer.

Source: Authors¹⁸

To ensure that the selection was suitable for the research, two factors were considered:

- i. the type of land use and activity in a given wetland, as housing developments have contributed to loss or degradation of wetlands over the years;¹⁹ and
- ii. discharge from developments under study.

With most developments in Harare, sewage has been discharged into wetlands, due to malfunctioning pipes. In essence, the sewage pipes are old and sewers bursting are a common occurrence.

THEORETICAL UNDERPINNINGS

Urbanisation is normally associated with population increase, which in turn increases the demand for public and private goods.²⁰ Population increase is, in some instances, associated with activities such as urban agriculture, which contributes to land use change. According to Feresu,²¹ urban agriculture involves different agricultural practices, part of which may necessitate land clearance through felling trees, which leads to massive deforestation. At the same time, irrigation development may also be employed to supplement erratic rainfall patterns.

The biggest challenge with urbanisation is the pressure it exerts on land. This is because land is always utilised during the development of superstructure and infrastructure in any city. Natural resources such as land and water are usually placed under pressure due to development activities that are critical in any housing project. According to Azous,²² urbanisation potentially affects the biotic characteristics of the land, which include vegetation, fauna and hydrology (surface and underground). Research carried out in Nigeria shows that urbanisation is one of the major causes of wetland depletion as there is a lot of agricultural activities carried out in metropolitan areas like Lagos. Agricultural activities, in turn, result in alien invasive species being introduced to the wetland areas.²³ Overharvesting of forest resources and the introduction of chemicals to wetland areas also contribute to wetland depletion.

Zimbabwe has also succumbed to in-migration due to prevailing economic challenges. According to the Zimbabwe Statistics Office, the population of Harare was 700 000 in 1982; the census for 2012 indicated a population of 2 098 199.²⁴ Harare is at the centre of socio-economic activity and has therefore seen an influx of people, which increases the demand for space.

The City of Harare has a number of wetlands within Harare's urban area. Wetlands are found in areas such as Avondale, Monavale, Borrowdale, Newlands, Ballantyne Park and Mandara. Most of these wetlands have been directly affected by infrastructure development.²⁵

Wetlands in Harare have been under pressure due to infrastructure development. Environmental and social impacts that emanate from the infrastructural developments result in a loss of beneficial habitats, loss of biodiversity and an increase in run-off on open surface areas. The increase in run-on open surface area has the potential to lead to suburbs in Harare being flooded.

THREATS TO WETLANDS

Wetlands have succumbed to human activities over the years. Pollution of underground water has the potential to affect the health of residents over time.²⁶ This is because the quality of water is altered due to the introduction of foreign chemical components.

Several schemes that target residential and commercial property developments on wetlands have been, and continue to be approved by the Harare City Council. Some of these are formal and informal developments that threaten the natural state of wetlands, damaging the flora and fauna in wetland areas and disturbing hydrological systems.²⁷

Wetland areas remain threatened in different parts of Harare. The Borrowdale area alone (north of Harare) has seen a retail shopping complex being planned for future development. Organisations forget, however, that the wetlands benefit the local population in times of drought, when water is scarce.

VALUATION AND BENEFITS OF WETLANDS

According to Nasi et al.,²⁸ valuation is related to the environmental functions or processes that occur in a given ecosystem. These environmental functions include preservation of wildlife habitat as well as water purification to the benefit of the human life in the vicinity of the wetland.²⁹ Wetlands therefore provide goods and services important to livelihoods.³⁰ Among such goods are fish production and the supply of clean water to the surrounding communities. Wetlands also provide a function of water purification, water retention and sedimentation control. They also minimise hazards such as flooding.³¹

WETLAND WATER QUALITY

Wetlands also improve water quality, as they act as natural water filters. Wetlands occur between land and open water and reduce pollution to the closest water sources. In other words, all the toxicants and metals that emanate from industries and mining activities could be managed through the use of wetlands.³²

Human health is also negatively impacted by housing developments in wetland areas. Goredema and Sithole³³ show that diseases emanate from the construction of houses in water-logged areas. They indicate that waste is dumped in wetland areas, as these are deemed open and disused areas. Diseases common in waterlogged areas are dysentery, cholera and diarrhoea (amongst others).

Malfunctioning sewer reticulation systems are a further source of pollution that may end up in urban wetland areas.³⁴ Lastly, urban agriculture is also known to contribute to wetland degradation. In instances where land is allocated in areas that overlook streams, the cultivation of maize, yams, sugarcane and vegetables is likely to take place.³⁵ This culture then results in eutrophication.

Stagnant or flowing water has the potential to receive external chemical and physical components.³⁶ Agriculture, and industrial and domestic practises can introduce different toxicants, nutrients and sediments to wetland areas. These anthropogenic practises have the potential of increasing phosphorous and nitrogen components in the wetlands.³⁷ These chemical elements are commonly known as pollutants, as they alter the quality of water.³⁸ The quality of water then either affects downstream users or contributes to the growth pattern of certain plant species in the water body.

WATER QUALITY STANDARDS

Pollutants contribute to chemical oxygen demand (COD) and biological oxygen demand (BOD).³⁹ BOD is defined as 'the measure of oxygen required for the degradation of organic matter'.⁴⁰ COD refers to the measure of organic material in water and this is used in relation to BOD. Wetlands are meant to reduce levels of BOD by decomposing organic matter

during anaerobic respiration. This means that high levels of BOD are meant to reduce the amount of oxygen required by plants.

Toxicants are mainly considered to be metals, viruses and bacteria in a wetland.⁴¹ Metals such as zinc and iron emanate from human activities such as mining and industrial activities. These metals undergo oxidation and reduction, depending on the aerobic and anaerobic conditions in the water.⁴² This means that the water will be deprived of oxygen, which affects the normal existence of aquatic flora and fauna in the wetland.

Physical parameters such as temperature and pH contribute to the above reactions. The toxicants and organic material in water work under a certain temperature, conductivity, salinity and pH level. Most aquatic organisms (bacteria) thrive in narrow pH ranges for reactions to occur. For instance, a temperature range of between 22-27°C and a pH range of between 6-7.5 is common in most water bodies where aquatic microorganisms thrive. These physical parameters permit irreversible reactions with metals, thus resulting in poor water quality.⁴³

Total TDS and salinity indicate the measure of salts in water. TDS mainly indicates inorganic salts and dissolved materials present in water.⁴⁴ The inorganic salts contribute highly to a balance that is required in water as the presence of chlorides, carbonates, sulphates, magnesium and potassium permits an exchange of these dissolved components between microorganism bodies.⁴⁵ An imbalance would mean that detrimental effects can be expected in the water.

Conductivity denotes the presence of ions in water. In other words, conductivity in a given stream or river indicates discharge from a particular point along the channel. It is important to note that dry periods may deliver reduced conductivity readings, as ion transportation may be minimal. However, upstream there could be higher conductivity due to recharge in the dry season.⁴⁶ However, in wet seasons, high conductivity is expected, as there is movement of ions due to washing.

Suspended solids contribute highly to turbidity of water. The measure of suspended solids depends on the flow rate of a stream, river or wetland area. The flow rate in any wetland contributes to the chemicals being stored over time.⁴⁷ A faster flow rate means that there will be a higher level of suspended solids compared to where there is a slow flow rate.⁴⁸ The suspended solids then reduce photosynthesis, as light is hindered by the particles and hence reduces productivity.

WETLAND HYDROLOGY

Hydrology denotes the flow, level and frequency of water in a given water body. The hydrology of a particular wetland has an important part to play. For instance, the flow of water contributes highly to salinity, conductivity and TDS in a wetland. Surface water is the main contributor of water in any wetland⁴⁹ and flows at a faster rate in the rainy season. Underground water has a significant part to play in wetlands as it regulates flow

in a given wetland.⁵⁰ With underground water, most of the water is released when the wetland depression is very close to the water table.

Hydrology is critical in wetland operations and management over time. This is because wetlands have different levels of water at any given time, due to the presence or absence of rain. The pattern of a wetland at any given season is known as a hydroperiod. This means that each season undergoes alterations, depending on the absence or presence of water, thus presenting different ecosystem productivity levels.⁵¹

When the plants are submerged, anaerobic reactions are highly likely. The submerged plants are likely to undergo anaerobic respiration as the pollutants increase, due to high flow rates. In other words, the ions, nutrients and toxicants react underwater at a faster rate due to the environment, which is anaerobic.⁵²

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

As already highlighted in the methodology section, the grab method of collecting samples was employed in the study. The results obtained from the four sampling sites in October 2013 and March 2014 are discussed further in the following sub-sections. The World Health Organization's (WHO) water guidelines were used for benchmarking and analysing the results.

WATER QUALITY IN BELVEDERE NORTH

The parameters analysed in this study were selected with respect to the activities in the wetlands. In this case, housing developments are associated with anthropogenic activities that have the potential of polluting the environment. As a result, total nitrogen (TN), total phosphate (TP), salinity, conductivity, temperature, DO and pH were selected as pollution indicators. According to Hemond and Benoit,⁵³ parameters such as phosphates, nitrogen, conductivity and DO emanate from anthropogenic activities. These indicators were analysed in October 2013 (dry season) and March 2014 (wet season).

The TDS was recorded as having a mean of 407.5ppm in October in comparison to a mean of 403.75ppm in March. The pH recorded showed a mean of 8.38 in October in comparison to a mean of 8.265 in March. This shows that the results were almost similar for both months. Results for both months are shown in Tables 10.4 and 10.5.

Table 10.4: Belvedere North water sampling data for October

Condition & Units	Phosphates mg/ℓ	Nitrogen mg/ℓ	Conductivity μs/cm	TDS ppm	Salinity	pH	DO mg/ℓ
Upstream	0.032	0.014	560	398	352	8.5	3.7
Midstream 1	0.033	0.014	579	410	362	8.3	5
Midstream 2	0.046	0.013	580	411	360	8.39	5.6
Downstream	0.039	0.014	580	411	364	8.34	5.8
Mean	0.0375	0.01375	574.75	407.5	359.5	8.38	5.025

Source: Authors

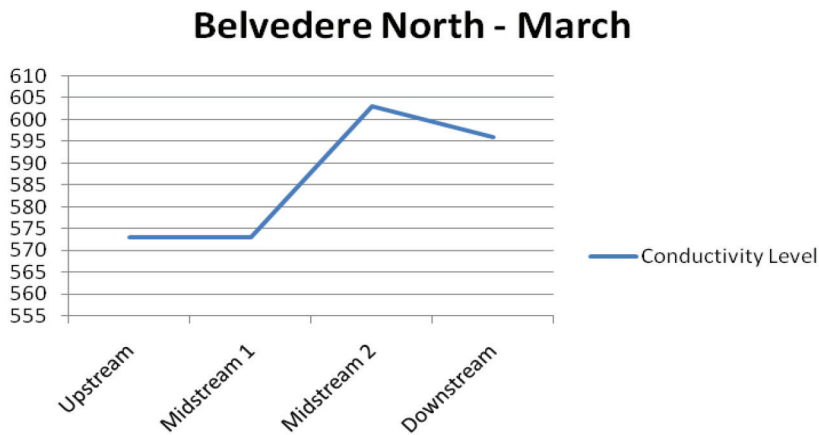
Table 10.5: Belvedere North water sampling data for March

Condition & Units	Phosphates mg/ℓ	Nitrogen mg/ℓ	Conductivity μs/cm	TDS ppm	Salinity	pH	DO mg/ℓ
Upstream	0.0125	0.045	573	407	303	8.5	7.1
Midstream 1	0.0125	0.044	573	400	307	8.35	6.3
Midstream 2	0.013	0.045	603	385	304	8.05	6.2
Downstream	0.0125	0.045	596	423	320	8.16	5.1
Mean	0.01262	0.04475	586.25	403.75	308.5	8.265	6.175

Source: Authors

The results shown in Tables 10.4 and 10.5 reveal that the conductivity levels were constant in both months. This confirms that wetlands act as a filter for dissolved and suspended solids, as indicated by Gambrell and Patrick.⁵⁴ Of note is the March sample result in Midstream 2, where it is highest (Figure 10.2). Water shows significant conductivity when dissolved salts are present. According to Schilperoort et al.,⁵⁵ over most ranges, the amount of conductivity is directly proportional to the amount of salts dissolved in the water.

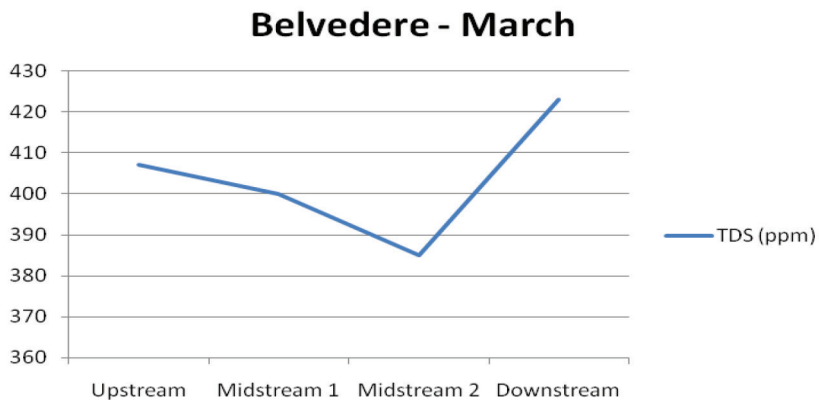
Figure 10.2: March conductivity levels in Belvedere North



Source: Authors⁵⁶

The TDS levels were more or less constant in both months. However, a figure of 423ppm (highest) was recorded downstream in the month of March. The results show that the downstream section was more contaminated than the upstream and midstream sections (Figure 10.3). High levels of TDS indicate the presence of salts and minerals. As water moves downstream, it is bound to dissolve more solids.

Figure 10.3: March TDS levels in Belvedere North



Source: Authors⁵⁷

However, there was a slight difference in nitrogen levels between the water samples taken in October and those taken in March (Tables 10.4 and 10.5). The results collected in

October were lower than those collected in March. The increase in nitrogen levels can be attributed to different agricultural activities in the wetland during these periods. The application of fertiliser could have increased the nitrogen level in the water. According to Hemond and Benoit,⁵⁸ cropland contributes the nitrogen component, due to fertiliser application and other anthropogenic activities.

The upstream section of the Belvedere North wetland showed what looked like a virgin portion. As such, water samples collected upstream were less polluted compared to downstream water samples. The existing settlement (shopping mall and residential houses) could have contributed to the increase in conductivity levels. The DO and salinity levels did not change significantly. This could have been due to the absence of agricultural activities as well as a slow flow rate in October. In the month of March, the flow of the river was faster than in October, resulting in the dilution factor coming to play.

The pH and temperature levels of both months were within acceptable/normal range, with most sections of the river showing a pH range of 7-8.6. A mean pH 8.265 was recorded in March and 8.38 in October, showing that the pH was within an acceptable range, which permits aquatic micro-organisms to thrive.

WATER QUALITY IN EPWORTH

The Epworth wetland shows high levels of conductivity, TDS, salinity and DO in the midstream and downstream sections of the wetland. The levels of conductivity alone averaged $828.5\mu\text{S}/\text{cm}$, showing that there were ions and solids in the water – probably due to settlements. These activities included subsistence agriculture, settlement, washing of clothes, artisanal quarrying, water abstraction and the erection of pit latrines. Water abstraction was considered as one of the main causes of wetland degradation. Water abstraction eventually reduces water quality. This is because organic matter from the base of the river mixes with water during the process of water extraction. This in turn increases the ions in the water.

The water samples of the upstream sections of the Epworth wetland show low conductivity, TDS and salinity levels. This could be because there are few settlements upstream and therefore the wetland section is heavily affected by anthropogenic activities. However, the readings increase significantly midstream and downstream, as shown in Table 10.6. It is important to note that the water quality results for TDS, salinity and DO at the midstream section were higher in October compared to of the results obtain in March (Table 10.7). There was little flow of water due to the dry season in October i.e. before the rains. The residents extract water, defecate and wash their clothes in portions of the wetland that have stagnant or poor flow of water.

Table 10.6: Epworth water sampling data for October

Condition & Units	Phosphates mg/ℓ	Nitrogen mg/ℓ	Conductivity μs/cm	TDS ppm	Salinity	pH	DO mg/ℓ
Upstream	0.016	0.016	130	92	86	7.5	3.1
Midstream 1	0.041	0.013	1242	876	757	6.7	10.8
Midstream 2	0.037	0.014	1241	891	751	8.3	9.1
Downstream	0.017	0.014	701	482	418	8.8	8.7
Mean	0.027	0.01425	829	585	503	7.8	7.9

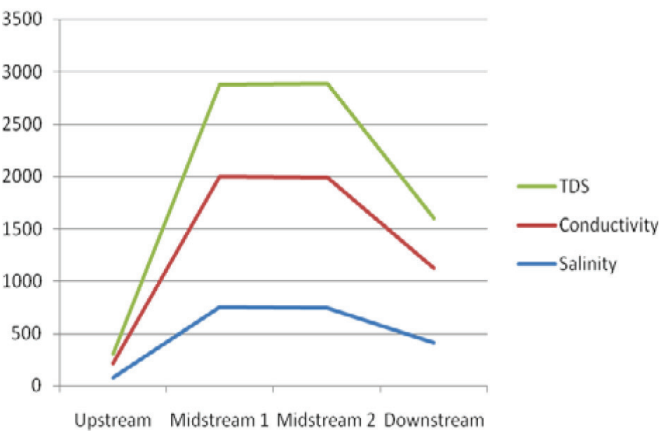
Source: Authors⁵⁹

Table 10.7: Epworth water sampling data for March

Condition & Units	Phosphates mg/ℓ	Nitrogen mg/ℓ	Conductivity μs/cm	TDS ppm	Salinity	pH	DO mg/ℓ
Upstream	0.013	0.045	156	110	88	7.4	3.2
Midstream 1	0.013	0.046	732	518	393	7.3	1.9
Midstream 2	0.0125	0.046	740	516	397	7.5	1.8
Downstream	0.0125	0.046	753	532	403	8.2	5
Mean	0.0125	0.04575	595.25	419	320.25	7.6	2.525

In Figure 10.4 it can be seen that the ions from these domestic activities could have contributed to TDS and salinity in the river. Anthropogenic activities contribute to the increase of TDS and conductivity in rivers close to settlements.

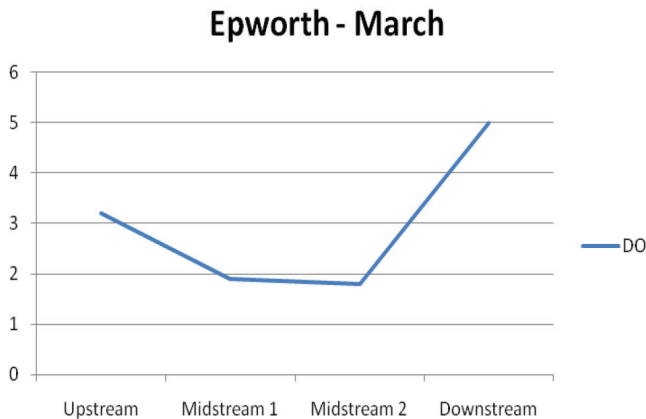
Figure 10.4: Conductivity, salinity and TDS levels in Epworth (October)



Source: Authors⁶⁰

There was an increase in DO levels in midstream sections (Figure 10.5). The DO could have increased due to the increase in organic components in the water in this section of the wetland. The DO increased from 10.8 to 9.1 and from 1.9 to 1.8, respectively, in both months. A DO measure of less than 2mg/l indicates poor water quality, which could be attributed to the presence of organic components in water. The water quality in the downstream sections improved marginally in comparison to the midstream section. As confirmed in the research done by Kotze,⁶¹ wetlands are important filters of pollutants. The total phosphates and total nitrogen present in the water may be emanating from post-agricultural activities and the pit latrines present in the wetland area. The sewage from the pit latrines could also contribute to the nitrogen that could have been released by sewage.

Figure 10.5: March – dissolved oxygen levels



Source: Authors⁶²

The conductivity and salinity of the midstream section was significantly higher in October than in March. Sewage has the potential of increasing conductivity. The pit latrines are all built on the wetland or at the periphery. In addition, sand extraction and artisanal quarrying could have results in the increase in ions in the midstream sections of the study area. A combination of pollutants from vehicles and mobile equipment could have contributed to the conductivity levels in the dry period. As noted by Hemond and Benoit,⁶³ some of these activities could have contributed to the ions present in the water.

CONCLUSION

The housing developments and agricultural activities contributed negatively to the quality of water in both case studies. The poor water quality was as a result of human induced pollution activities. Measures of DO, TDS and conductivity increased from October to March in both study areas. The study found that ions increased significantly downstream of the wetland. The ions were contributed by activities such as:

- i. sand extraction;
- ii. the sinking of wells; and
- iii. the sinking of the wetlands.

Total nitrogen and total phosphate also increased significantly in the midstream sections of both wetlands, due to agricultural activity. To reduce pollution, an idea was proposed that led to the establishment of environmental committees at community level.

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PART V

Climate Change, Tourism and Wildlife Matters

News Media Coverage of Climate Change

Perspectives from South Africa and Zimbabwe

Henri-Count Evans and Rosemary Kudzayi Musvipwa

ABSTRACT

Media coverage of climate change in Southern Africa remains poor. This is notwithstanding the fact that the region is greatly affected by the changing climate and is in need of more information about how to adapt to the changes. The role of the media, as a primary source of public information, and a definer of reality in communicating climate change in Southern Africa, is important if the region is to address the problems brought by the changes in climate. The research examined how the media (television and newspapers), particularly in South Africa and Zimbabwe (loosely interchanged with Southern Africa given the spread of the media houses used, and one newspaper drawn from Namibia) has reported on climate change issues, and specifically the frequency and patterns of climate change reporting. The study used the mixed-methods approach as the chosen methodology. News stories for analysis were downloaded from the news websites of all the media houses that were sampled. The study began with a quantitative gross collection of all news articles relating to climate change, the number (frequency) in each newspaper, the point of origin (either local journalists or global news agencies) and the relevance to the region. Interviews were conducted with journalists to develop an understanding of the reasons behind poor coverage of the topic. *The Standard* (Zimbabwe), *The Herald* (Zimbabwe), the Zimbabwe Broadcasting Corporation (ZBC TV), the South African Broadcasting Corporation (SABC), eNews Channel Africa (eNCA, South Africa), Independent Online (IOL, South Africa), *The Namibian* and *Mail & Guardian* (South Africa) were chosen as media house case studies for this research. Data from the study showed that the coverage of climate change by the Southern African media is low and that it is linked more to international events, with few stories being relevant to regional climate change issues. The study established further

that the reporters who cover climate change issues lack the training and specialised skills necessary to cover the topic satisfactorily.

INTRODUCTION

The role of the media in communicating climate change in Africa (in general) and Southern Africa (in particular) is important if the region is to address the problems brought about by changes in climate. The media, as a primary source of public information, is central in the mainstreaming of climate change due to its ability to inform, educate and interpret everyday reality. This paper asserts that climate change is one of the biggest threats to human survival in Africa, due to the continent's reliance on rain fed agriculture. Climate change has led to an increase in global and regional mean temperatures and reduced precipitation in Sub-Saharan Africa. Climate change has been described as 'a leading human and environmental crisis of the twenty-first century'.¹ Due to climate change, resource scarcity under extreme climatic conditions 'strengthened fears that environmental degradation and demographic pressures will displace millions of people in Africa and create serious social upheaval'.²

The news media could play a pivotal role in influencing local perceptions and attitudes and influence policymaking on the issue. In this regard, the media becomes the space for the production, reproduction and transformation of regional attitudes towards climate change adaptation and mitigation.³ The news media, in particular, 'function specifically as an authoritative version of reality that specialises in orchestrating everyday consciousness for the public'.⁴ Climate change communication (green communication) as discourse practice, requires an informed citizenry that is capable of interpreting climatic and weather patterns, which will, in turn, enable them to take informed decisions with regard to their environmental action as individuals, groups and greater communities.

CLIMATE CHANGE AND THE MEDIA: A REVIEW

Southern Africa has a low climate change coverage profile. The prevalence of political and economic reporting in the media often means that environmental news is seldom given prominence.⁵ It has been argued that the preponderance of political and economic reporting has led to a low environmental and climate change coverage profile in the media landscape, which is tantamount to reduced public comprehension of the impact and threats brought about by the change in climate.⁶

The media, government, civil society and ordinary citizens at large have a role to play in fighting and averting the problems being brought about by climatic changes.⁷ It has been argued that the public receives much of its scientific information from the mass media.⁸ Media representations are an important factor in the public's understanding of

and engagement with climate science. The absence of climate change information in the mainstream media⁹ makes it difficult for people to have a clear understanding of the climate change discourse. This paper argues that media coverage of climate change is important in shaping people's perceptions of environmental and climate change issues. As argued by Aswani et al., people's perceptions of environmental and climate change issues 'are fundamental for designing comprehensive and inclusive mitigation and adaptation plans'.¹⁰ They noted that 'local and indigenous peoples' environmental knowledge can provide critical information about protracted and rapid climatic and ecological changes'.¹¹

Johannessen contended that '[T]he mass media is a central arena where the struggle to define the climate crisis plays out and through which most citizens are exposed to these issues'.¹² She saw the mass media as an important tool of communication that is useful in 'mediating between the different groups of actors and competing knowledge claims, framing climate issues for politics and the public, and drawing attention to how to make sense of, and value, the changing world'.¹³ Wasserman cemented this argument by asserting that 'the media's role in contributing to public understanding of climate change is crucial'.¹⁴

Despite the importance of the media in mainstreaming climate change, Mare argued that '[D]espite the severity of climate-related impacts on economies and livelihoods, climate change mediation remains absent from some African newspapers, whether daily, weekly or monthly'¹⁵ and further¹⁶ noted that 'the mediation of the climate change story in Southern Africa is still lethargic and spasmodic [and does not] seem to reflect the urgency of the issue at hand'.

While studying the use of the media in disseminating climate change information in Nigeria, Falaki and Adegbiya¹⁷ maintained that effective climate change adaptation was constrained by 'inadequate information due to inadequate media coverage' of the subject. The South African National Climate Change Response White Paper¹⁸ saw the poor coverage of climate change in South Africa as pointing to 'a rather depressing picture of journalism's neglect and failure in the face of one of the biggest challenges of our time'. As Tagbo¹⁹ observed, '[T]he quantity of climate change coverage in Africa is disproportionate to the level of threat it poses to the continent'. It has been noted that climate change information flows from the rest of the world to Africa at the moment. The *British Broadcasting Corporation* (BBC) World Service Trust²⁰ noted that this trend in climate change information flows:

... needs to be replaced by a sustained dialogue and two-way flow of information that empowers African citizens and ensures publics and politicians in countries mainly responsible for causing climate change are better informed about African realities and perspectives.

METHODOLOGY

The research examined how the news media (television and newspapers), particularly in South Africa and Zimbabwe, has reported on climate change issues. In order to create a better understanding of the climate change coverage profile, the chapter examined and analysed the frequency and patterns of climate change reporting in the aforementioned countries whose predominant target audience reach is comprised of middle and upper class (professionals and the affluent) urban dwellers. Although we specify South Africa and Zimbabwe herein, the fact that the media houses selected are regional makes it possible to interchange the two countries with Southern Africa. Hence, Southern Africa will also be loosely used in the chapter. The study used the mixed-methods approach as the chosen methodology. News stories for analysis were downloaded from the news websites of all the media houses that were included in the sample.

The aim of the chapter is to examine the coverage of climate change news in South African and Zimbabwean news media; this prompted a mixed methods research philosophy. The mixed methods approach, especially the concurrent method, allowed for the triangulation of data sources, including the news texts produced, the frequency of coverage, their origin and lastly the qualitative in-depth interviews with journalists in an effort to explain the reasons behind coverage trend. As noted by Creswell,²¹ the triangulation of multiple data sources seeks a convergence of insights from both the qualitative and quantitative methods.

Drawing from Creswell²² the data analysis procedure was concurrent (news articles were first downloaded, counted and analysed alongside the interviews that were done with the journalists). This method enabled the researchers to converge 'quantitative and qualitative data in order to provide a comprehensive analysis of the research problem'.²³ The method of concurrent triangulation was employed in collecting both the qualitative and quantitative data at the same time during the study, and the data were integrated and analysed in the interpretation and presentation of the overall results.

In choosing the mixed methods approach, the paper sought to collect diverse types of data that could provide an understanding of the research question. The study began with a quantitative gross collection of all news articles relating to climate change, followed by a scan-type reading²⁴ of the texts, in order to assess: suitability to the overall research aim; number (frequency) in each newspaper; point of origin (either local journalists or global news agencies); and relevance to the climate issues of Southern Africa. This procedure was then followed by the thematic analytical focus of the stories' geographical focus, and the sources used in the stories (only for stories that were written by local journalists and not from global news agencies). Interviews were then done to develop a detailed understanding of climate change news coverage scenarios in Southern Africa. The journalists who were chosen to be interviewed were selected based on the climate

change or environmental stories they had written. Generally, all the local in-house journalists who had had stories published in the news media houses selected were chosen for the interviews.

The research findings and analysis are presented according to themes derived both deductively and inductively from the data. Within the presentation and analysis of each theme, the first step was a presentation of the results obtained from data collection, followed by a discussion and interpretation of the findings. Furthermore, for each theme, there is an in-case analysis of each case study and then an overall collective-case analysis of all the cases discussed under that particular theme.

The Standard (Zimbabwe), *The Herald* (Zimbabwe), the ZBC TV, the SABC, eNCA (South Africa), IOL (South Africa), *The Namibian* and *Mail & Guardian* (South Africa) were chosen as media house case studies for this research. These news organisations were chosen because they are national in terms of coverage and are considered renowned media institutions in Southern Africa. This chapter acknowledges that all the media houses included in this sample are read by political, social and economic elites and hence have the potential to influence climate change attitudes and climate policy decisions within their countries and the region. These media houses, through their wider audience base, set the agenda for their audiences, and the coverage or non-coverage of climate change stories in these media institutions has a bearing on their readers' perceptions of climate change and likely to shape their actions towards climate change debates and attitudes.

The study examined articles that were published between January 2013 and December 2014 if the primary theme fell into the following categories:

- i. climate change;
- ii. environment; and
- iii. global warming.

All stories published between January 2013 and December 2014 appearing on the websites of *The Standard*, *The Herald*, the ZBC, the SABC, eNCA, IOL, *The Namibian* and *Mail & Guardian*, which satisfied the above parameters, were recorded for analysis.

The entire text of each article was examined for themes and a relationship to climate change. Among the various themes were: climate change evidence; causes of climate change; consequences of climate change; controversy among scientists; economics/costs of remedy; climate change response; the green fund; curbing emissions; and climate change adaptation.

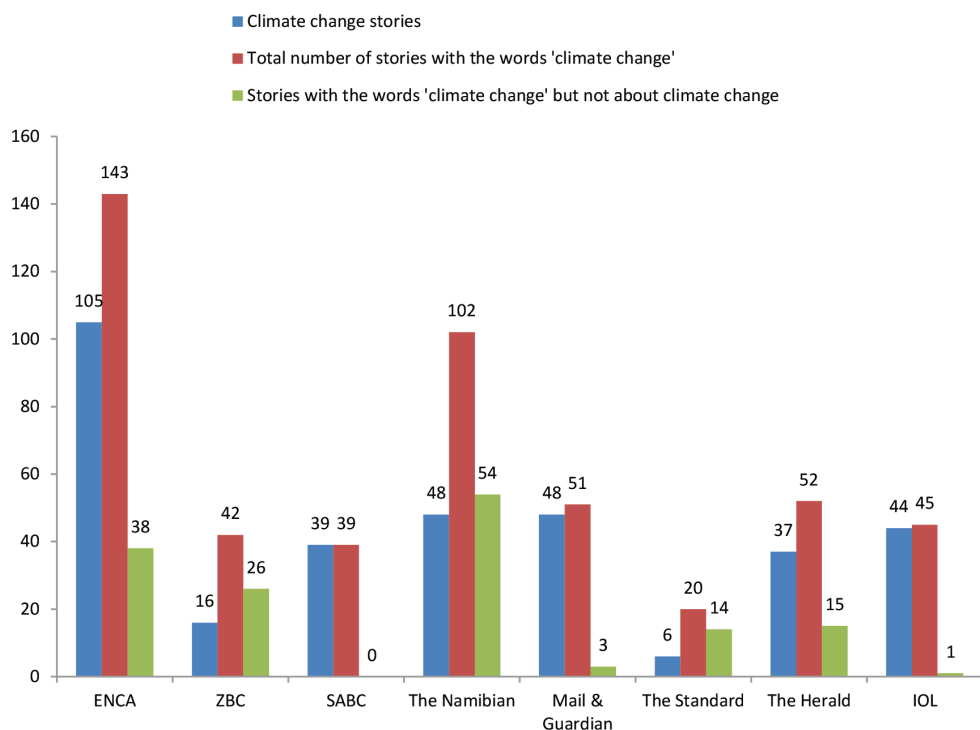
Each theme was coded as 'not present', 'present' or 'outstanding focus/appearing in the lead'; this allowed the researcher to track the importance of the story theme during the sample period. If a story began with 'Scientists attending the United Nations Climate Change Conference in Cancun, Mexico have revealed that there is scientific evidence that there are serious threats of climate change to health', for example, then both 'consequences' and 'new evidence and research' was coded as the story's outstanding focus. If

the story went on to describe how politicians reacted to the study, then 'domestic politics' was coded as 'present', although as a secondary theme.

RESULTS PRESENTATION AND ANALYSIS

This section presents and discusses the research findings. The interpretation and analysis of the findings is rooted in the objectives of the study. Figure 11.1 reveals that the level of climate change coverage in the regional news media is very low. eNCA and *The Namibian* had the highest number of stories that included the words 'climate change' and 'global warming' in 2013 and 2014.

Figure 11.1: Frequency count for key climate change terminology



Source: Authors²⁵

THE NAMIBIAN

In *the Namibian*, the majority of the stories were not specifically linked to climate change. Of a total of 102 stories, 54 were about the general environment and other developmental

issues. Notably, the coverage was motivated mainly by the global meetings about desertification that were held in Namibia.

The findings showed that the majority of the stories were event-based and also related to official announcements and major political meetings – globally and regionally. The reports were also anchored on the meetings organised by the United Nations Framework Convention on Climate Change (UNFCCC) and the Inter-Governmental Panel on Climate Change (IPCC). News stories published in *the Namibian* reflected an element of what can be referred to as ‘officialdom’, as only the official line was taken, especially with the way the media covered statements made by governments on how they intended to respond to climate change, reduce their emissions and curb international contributions. This chapter avers that the problem with following the official line is that the media fails to represent the interests of the public, i.e. those affected by climate change, and hence fails to hold governments accountable. The media is duty-bound to act as a public watchdog and fourth estate and hold public officials accountable for their decisions and policies regarding climate change, and to protect the interests of the groups in society that are most vulnerable to climate change.

SOUTH AFRICAN BROADCASTING CORPORATION (SABC)

The SABC relied heavily on climate change-related events and announcements. Most of the stories related to meetings of UNFCCC and climate change reports released by the IPCC. News articles by the SABC were alarmist and presented climate change as a problem that would destroy the world; but they lacked content on how the problem could be mitigated and adapted to. However, particularly noticeable in terms of the climate coverage by the SABC is the use of government officials as news sources.

The news articles followed a certain method of reporting, whereby the headline talks of climate change, although the subject is only buried at the end of the story. Some stories by the SABC were based on arguments and disagreements between the developed and the developing countries at Conference of Parties (COP) meetings regarding responsibilities in fighting climate change.

ZIMBABWE BROADCASTING CORPORATION (ZBC)

The study noted that the ZBC’s coverage of climate change is poor, with the media house having published only 42 stories in 24 months, of which only 16 were directly related to climate change. The bulk of the stories produced by the ZBC comprised political announcements by the Minister of Environment, Water and Climate, and the Zimbabwean president. Of key importance is that the reports by the ZBC, as in the case of the SABC, were closely linked to events and announcements. The reports followed government’s official lines, with no effort made to cover the ordinary people affected by the changes in climate. Again, the reports were problematic because of the terms used. Most often

'global warming', 'climate change', 'greenhouse effect' and 'climate variability' were used interchangeably. All 16 stories about climate change by the ZBC were produced by ZBC reporters themselves.

THE STANDARD

Stories covered by *the Standard* were based on announcements. During the two years under discussion, *the Standard* published the least number of climate stories compared to the other media houses covered in this study. Only six articles directly related to climate change were published.

MAIL & GUARDIAN

The *Mail & Guardian* published 51 stories that included the words 'climate change' and 'global warming'; of these, 48 were directly related to climate change. This source, like the others, concentrated on stories related to international events and disasters. This newspaper published the highest number of stories related to disasters, especially the super typhoons Haiyan and Hugapit. The *Mail & Guardian* had the highest number of opinion articles and sponsored stories. The most prevalent theme in all the stories covered was 'evidence of climate change'.

ENEWS CHANNEL AFRICA (ENCA)

eNCA had the highest number of stories that were directly linked to climate change, and those that included the words 'climate change' and 'global warming'. The eNCA television news station produced 105 stories related to climate change during the study period. These stories still followed the patterns synonymous with the other media houses. Coverage was based on events and pronouncements by the UNFCCC, IPCC and UNFCCC-organised COP meetings. The station presented the highest number of stories that were not linked to Africa in any way. The majority of its time was devoted to Australian news stories. This could have been as a result of over-reliance on news from foreign news agencies. The station had reports urging the Australian government to abandon carbon taxes following the Australian example. This story was attributed to statements made by Steel and Engineering Industries Federation of Southern Africa (SEIFSA). The acceptance of the story, especially coming from an economic section that is an environmental culprit, symbolises the complex relationship between the media and business. The story argued that abandoning carbon taxes would work to the advantage of the economy. In the short term that would sound normal, but no attempt was made to look at the consequences of such action, which would allow industries to emit more greenhouse gases (GHGs).

This news medium also carried stories related to the two major typhoon disasters that affected the Philippines in 2013 and 2014, viz. super typhoons Haiyan and Hugapit. The

coverage of climate change during disaster periods reinforces the journalistic principle of 'when it bleeds it leads', thereby negating the coverage of other major climate change related problems with the view of either mitigating or adapting. This pattern of coverage follows Downs¹²⁶ environmental coverage hypothesis: he argued that journalists only pay attention to environmental issues when there is a disaster and as the disaster fades, so does media attention regarding the environment.

THE HERALD

During the period under study, this newspaper published 52 stories. However, only 37 of these were directly related to climate change. Coverage was poor, in general, and the newspaper relied heavily on opinion articles from one of its business reporters, Jeffrey Gogo. The quality and accuracy of these stories were very low as well. Similar to the other media sources covered, stories in *The Herald* were also related to key announcements by UNFCCC and IPCC. All the articles published by the paper were produced internally.

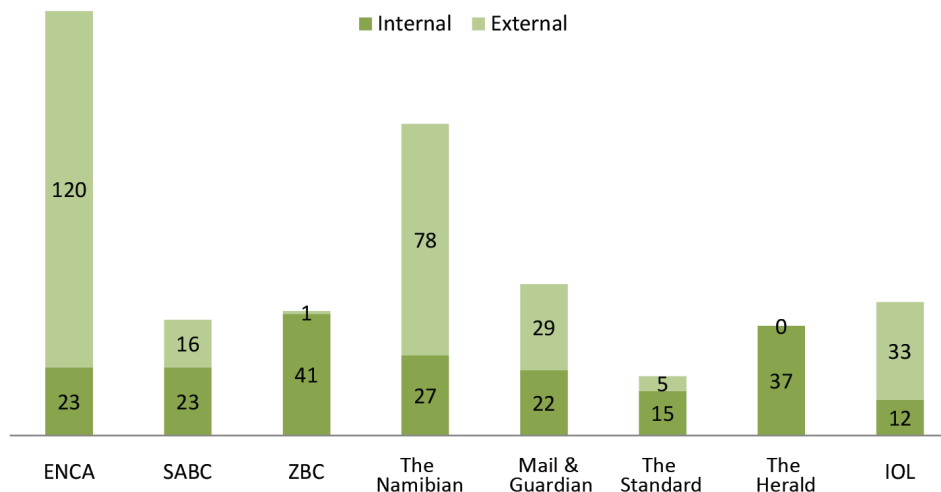
INDEPENDENT ONLINE (IOL)

The stories that were used were taken from all the newspapers in the IOL stable. In total, the newspaper company ran 45 stories, 44 of which were closely linked to climate change.

DISCUSSION OF RESULTS

NEWS ORIGINATION AND SOURCING PATTERNS

This paper noted that the majority of news articles relevant to the study were adopted from news agencies. Figure 11.2 shows that stories sourced from global news agencies exceeded those produced by local journalists. The most dominant news sources were Reuters, Agence France Presse (AFP), the South African Press Agency (Sapa) and Namibia Press Agency (Nampa). Of all the news agencies, there was a preponderance, or preference for stories taken from AFP and Reuters.

Figure 11.2: Internal and external stories sourcingSource: Authors²⁷

IOL for example, sourced more of its stories from news agencies than all the other news media houses. Of the 44 stories published on its website, 33 were supplied by the news agencies AFP and Reuters. The *Mail & Guardian* also relied on stories supplied by news agencies. Of the 48 stories that were directly related to climate change, 29 were sourced from news agencies, while only 19 were produced internally. Like other media houses, the SABC also relied on news from news agencies. Even though the SABC produced the majority of its stories internally, 16 of the 39 stories that were studied were obtained from news agencies. The study noted that the stories from news agencies, especially Reuters and AFP, lacked local relevance in their representations. The stories were detached from local problems and largely focused on global problems. This dichotomous pattern of representation creates the notion that climate change is mainly a problem of those affected and the idea that local audiences are not affected, giving room to the ‘us’ versus ‘them’ thinking among the audiences. This, in turn, results in the creation of the mentality that climate change is happening elsewhere and hence decelerates or slows the action taken by local people. Tagbo also argued that the stories published in the South African media were tied to international events ‘with neither a South African nor an African background’²⁸ adding:

The framing of the news sometimes depicts the issue of climate change as a concern only for the elites and those in government. The dominance of international framing in the newspapers used here, with little human angle to the stories, reflects similar results in studies done in this area by other researchers.

Relying more on news from international news agencies has the potential of limiting the available discursive discourses or debates on a subject and reduces the capacity of people to discuss issues other than those prescribed by the dominant news agencies. This bottlenecks the media landscape and defeats the whole purpose of the media as an alternative space, where divergent voices and discourses are discussed and debated. It must be noted that, through selection, gate-keeping and framing, the news agencies set the agenda on what the public knows and how they come to know about it. In line with this argument, limited media or communication mediums could limit what people know and the frames of reference they can follow. The dominance of news from foreign news agencies subjects the people in the South to the ideological frameworks of those in the West.

These results confirm arguments made by Tagbo,²⁹ who, while studying media coverage of climate change in South Africa and Nigeria, observed that the media in South Africa have news stories on climate change that are tied to international events and taken from major global news agencies, such as the Reuters, noting, '[M]any such stories were about climate change impacts outside South Africa'.³⁰

In terms of the sourcing patterns, the selection of sources by all the news media that were analysed reflects their ownership and control patterns. State-run media institutions, such as the SABC, *The Namibian*, the ZBC and *The Herald* get most of their stories from their associated governments, and this is highlighted by their reliance on government or official sources (ministers, presidents and government officials). The state media institutions give more attention to the government and at times side-line climate change experts, who have the potential to tell a different story to the one provided by governments and hence disturb the official position.

NEWSROOM PRACTICES

The researcher interviewed a total of ten news personnel, including reporters and editors. The interviewees were chosen by convenience, depending on their availability for the interview. Online and telephone interviews with the news reporters revealed that climate change (in particular) and the environment (in general) were not getting widespread coverage in the media as a result of several factors. Firstly, interview responses indicated that economic factors were the most deciding factor in the production of news stories. Practitioners from the sampled media houses noted that they fail to cover climate change extensively due to serious financial challenges.

All the journalists who took part in the interviews concurred that news production constitutes a business and thus there was a need to prioritise news stories that sell. They all argued that stories on climate change issues rarely or never sell, especially if there is no major disaster or event involved. The research revealed that economic decisions matter most in news coverage, hence the side-lining of stories that cover less 'dramatic' issues — like climate change.

From the interviews it can be concluded that only two journalists are dedicated to climate change coverage: one from *The Namibian* and the other from the *Mail & Guardian*. The remaining reporters cover general assignments and tend to only write about climate change if the editor assigns them to cover a climate change related event. This could explain why the majority of stories have a high level of inaccuracy and inconsistency. During the diary sessions (news planning meetings) across the news organisations, there are no specific quotas as to how many stories each reporter should write about the environment.

This study supports the findings of Evans;³¹ in a study on problems affecting climate change communication in Zimbabwe, he asked one senior editor at *The Sunday News* (Zimbabwe) about the frequency of climate change coverage and the editor responded, 'As and when they become available'. This statement explains, to some extent, the poor representation of climate change and environmental issues in Southern African news media. Climate change and environmental issues only get published when there is a major environmental disaster or event.

The journalists who participated in this study lacked scientific knowledge relating to climate change. They could not make a clear distinction between climate change and global warming and to them global warming was just another term for climate change. Of all the reporters interviewed, only three had received scientific training or had done a course on specialised reporting about climate change. They only covered environmental issues if there was an event happening and not because of interest in the subject. Despite most of them indicating that they had previously attended climate change workshops, the information imparted at these workshops is not included in the stories that they write.

The reporters concurred that climate change coverage in Southern Africa was very poor and more had to be done to improve climate change coverage. As one journalist argued, 'Given the serious problems Africa faces in a world that is 1.5 degrees Celsius warmer, I think our coverage is atrocious'. One journalist argued:

Climate change is reported as an abstract thing based on wire stories that are taken from overseas press releases and scientific research [...] Climate change is hard to make tangible, so I try to add the dimension of climate change stories and how it would exacerbate problems, rather than writing articles exclusively on climate change.

Kakonge³² blamed the poor understanding of climate change in Africa on 'structural and capacity weaknesses of the media sector'. He argued that the weaknesses are found in 'inadequate business models of media organisations to the lack of skills by journalists to interpret and report information and by editors, analysts, and researchers to efficiently and accurately find and analyse climate change information.

Another journalist remarked, 'The problem in reporting on climate change is its lack of immediacy. In most cases, climate change is a 'future' story, where the impacts are theorised, so reporting on current impacts is hard'. This is consistent with Johannessen,³³

who saw the scientific nature and the need for specialisation of climate change journalism as the major barrier to effective communication of climate change by the media in Africa, as most journalists lacked this requirement. She explained: '[E]nvironmental issues often require further investigation and more external input than many other subjects, and because its impacts are less immediate and direct than many other pressing concerns, such as unemployment and crime',⁵⁴ the subject will seldom receive equitable coverage compared to other news beats, such as politics and entertainment.

The diarising of climate change stories was also avoided, because of the complexity of the topic. The researcher discovered that there is a lack of interest among journalists regarding coverage of climate issues. Instead, most of them choose to focus on 'easy to understand' topics, such as politics, general news, and health and entertainment, which do not require extensive specialised (skills) training. Furthermore, journalists revealed during the interviews that news writing conventions also work against covering climate change and environmental issues in the media.

The news writing guidelines, especially the use of the inverted pyramid, put more pressure on journalists to look for and produce stories that sell faster. The inverted pyramid form of news writing ensures that all the key ideas of the story are at the top of the article, followed by less important material being added towards the end. However, the method puts pressure on journalists to look for 'timely news pegs' and forces them to neglect issues that are important, but which may not be topical at the moment. The journalists are given tight deadlines and in the end only write stories that are readily available. This is in order to generate headlines and leads that could improve the sale of stories to audiences. Regarding climate change coverage, the reporters felt that it was difficult to come up with catchy headlines and leads, unless the story was about an environmental disaster, such as an earthquake or major typhoon. Reporters noted that their focus is mainly directed towards politics and the economy, and that they also tend to look for stories that have the capacity to sell the paper in the difficult economic environment.

CONCLUSION

Climate change coverage in Southern Africa remains low and is inconsistent. This study examined coverage of climate change by the mainstream media in Southern Africa (both print and electronic) and the results show that the frequency of climate change stories is low. The majority of the analysed news stories related to climate change were sourced from international news agencies, especially AFP, AP and Reuters. It is also important to note that the reliance on news from global news agencies, such as those noted above, often leads to the publication of stories that are of little or no local relevance. Privately owned media published the highest number of stories that originated from global news agencies. With the few stories that were written by local journalists, these were based mainly on events related to UNFCCC conferences and the publication of scientific reports.

Finally, the study noted that with state-owned news outlets such as the SABC, the ZBC and *The Herald*, more attention was given to speeches delivered by environmental ministers and by presidents. This trend indicated that the official lines were followed by the news outlets, without any criticism being raised. It was established in this study that very few news reporters are either strictly dedicated to environmental/climate change stories, or have an interest in climate change science. This has led to the low coverage profile found across all the news media sources that were analysed. Research on media coverage of climate change in Southern Africa is still in its infancy, and it is hoped that this study will contribute towards the body of literature on the subject and also help media practitioners to develop an interest in climate change issues and to give the topic more attention. Such a change could have a positive impact on the news practice of journalists regarding climate change communication, and could help audiences understand climate change issues and develop attitudes necessary for effective climate change adaptation and mitigation behaviour.

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Mainstreaming Climate Change into Wildlife Policy

A Review of Legal and Policy Frameworks in East and Southern Africa

Olga Laiza Kupika and Godwell Nhamo

ABSTRACT

Climate change poses one of the greatest challenges to wildlife management in Africa. With increasing trends in climate change related natural disasters in Africa (particularly extreme weather events like drought, heat waves, floods, cyclones, frost and wildfires), it is imperative to understand how international community, regional organisations and selected African countries are addressing such problems through legislative provisions in the context of biodiversity management. This paper reviews international, regional and national wildlife policies from selected East and Southern African countries, in order to determine the extent to which the biodiversity/wildlife legislation has mainstreamed climate change. The key finding is that the majority of sampled Southern African countries are still using old generation wildlife management legislation that, at times, fails to address climate change.

INTRODUCTION

Africa is endowed with a variety of wildlife species, ranging from mega- to micro fauna. Chidumayo et al.¹ noted that life on the African continent is largely shaped by the availability and quality of wildlife resources. East and Southern Africa is home to approximately 72 and 65 endemic species, respectively, which are under threat from climate change that leads to extreme weather related events such as drought and floods.² Climate change refers to 'any change in in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persist for an extended period, typically over decades or longer'.³ Climate change may be due to 'natural changes or to persistent anthropogenic changes in the composition of the atmosphere or land use'.⁴ The

United Nations Secretariat⁵ defines climate change as ‘a change in weather conditions that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over a 30-year period’.

When interacting with other anthropogenic factors such as fires, deforestation, illegal harvesting, agricultural expansion due to rapid population growth and poverty, climate changes poses a threat to Africa’s ecosystems. There has been an increase in the frequency and severity of climate change related hazards, which increases the vulnerability of wildlife resources.⁶ African wildlife species are vulnerable to climate change due to a combination of factors related to change in surface water supply, lack of habitat connectivity, specific range requirements, reproductive biology limitations, population growth, genetic bottlenecks, heat stress, food scarcity, disease prevalence and intra- and interspecies interaction.⁷

Climate change has direct and indirect effects on herbivore populations⁸ through changes in the fitness, survival and reproductive success of individual species.⁹ Observed global effects of climate change on wildlife species include a change in ranges and the distribution of species.¹⁰ The Intergovernmental Panel on Climate Change (IPCC) observed that climate change affects ecosystems either: directly through seasonal change in temperature and precipitation; or indirectly through disturbances such as fire and drought.¹¹ Climate change further results in a change in the timing of life history events and/or phenological changes, and effects demographic matters such as survival and fecundity.¹² Lastly, climate change leads to a decline in the wildlife population due to habitat loss and incidents of pathogens that may result in illness and deaths.¹³ Ogutu et al.¹⁴ noted that, in Kenya, climate is one of the major factors controlling wildlife species abundance, as indicated by direct effects such as a shift in species distribution, and the expansion, reduction and disappearance of individual species range.

Overall, results from current and modelled wildlife species range in selected parks in East and Southern Africa show that protected areas will experience more species loss than gain.¹⁵ This is likely to impact negatively on wildlife tourism. Terrestrial wildlife species contribute immensely to the economy, environment and livelihoods of African societies.¹⁶ Ervin¹⁷ noted that ‘although there are potential trade-offs between managing protected areas for biodiversity and for climate, the overwhelming societal, economic and ecological benefits of protected areas make them a natural and cost-effective investment’. Although wildlife species and populations have the potential to adapt naturally to the effects of climate change, some scholars contend that the observed and projected effects of climate change might warrant human intervention measures.¹⁸ Hannah¹⁹ noted that the role of protected areas, as a policy response for mitigating the effects of climate change, has been underestimated. Therefore, there is a need to identify practical strategies that could help to reduce the anticipated effects of climate change on wildlife species on the continent.²⁰

The climate change agenda became a global concern during the 1992 United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro and which resulted in ratification of the United Nations Convention on Climate Change (UNFCCC) in 1993.²¹ Since then, international conservation treaties, agreements, protocols and institutions have incorporated climate change in their plans. Twenty years later, heads of states gathered to map the way forward with regard to sustainable development²² issues during the Rio+20 summit.²³ Despite all efforts to ensure policy evolution in wildlife management, a major question still remains: How has the postcolonial wildlife governance paradigm shift incorporated climate change adaptation and mitigation? The International Fund for Agricultural Development (IFAD)²⁴ noted that in East and Southern Africa, the effects of climate change will be exacerbated by poor management of natural resources in the region. Thus, more work needs to be done in order to describe, understand and predict the effects of climate change on wildlife in protected areas in Africa to inform decisions on biodiversity policy reviews.²⁵

In October 2010, the United Nations Convention for Conservation of Biological Diversity (UNCBD) made a decision (Decision X/2) at the tenth meeting of the Conference of the Parties (COP10), held in Nagoya, Japan, to adopt a revised and updated Strategic Plan for Biodiversity.²⁶ The Strategic Plan included the Aichi Biodiversity Targets, for the period 2011-2020.²⁷ The Aichi Biodiversity Targets set out strategic goals, the technical rationale, implementation strategies, indicators and baseline information for sustainable conservation of biodiversity. Strategic Goal D focuses on the need to 'Enhance the benefits to all from biodiversity and ecosystems services'.²⁸ Target 15 states:

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks will have been enhanced, through conservation and restoration, including restoration of at least 10 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.²⁹

In addition, the Rio+20 document, *The Future We Want*, mentions the need to recognise the rights of nature in the context of promotion of sustainable development.³⁰ The document specifies that it is imperative for all member countries to promote harmony with nature. In *The Future We Want*, Goal 11 notes 'the need to conserve plant and animal genetic resources, biodiversity, ecosystems and enhancing resilience to climate change and natural disasters'.³¹ In light of this, countries have a mandate to come up with an enabling policy framework to combat the impacts of climate change.

Although most African countries are party to a number of international and regional multilateral and bilateral agreements that deal with climate change, there is lack of information on how the wildlife sector has mainstreamed climate change related disasters in their national laws and policies. Masters and Duff³² noted that climate change adaptation needs to be mainstreamed and effectively implemented into international and national legal and institutional frameworks. If the biodiversity and climate change

related treaties, such as the Convention on Biological Diversity (CBD), the Convention on Migratory Species (CMS), UNFCCC and the Kyoto Protocol are to have national effect, they have to be incorporated into national legislation, depending on the country's constitutional system. Wildlife managers are therefore faced with the task of incorporating climate change mitigation and adaptation strategies into management plans. This will ensure sustainable conservation of wildlife resources despite the changing climate.

Protected areas play a vital role in adapting to climate change, by providing a buffer against extreme climate events,³³ rapid migration, space for evolution and adaptation of species. Climate change impacts vary from one protected area to another and depend on geographical location. This implies that each protected area has inherent opportunities and threats in terms of a changing climate.³⁴ Therefore, human intervention might be necessary to avert the effects of climate change on wildlife resources. Chidumayo³⁵ highlights the need to incorporate predicted climate change impacts into national wildlife management plans and the need to review and modify existing laws, regulations and policies regarding wildlife management. The post-Rio+20 period calls for action to combat climate change in key sectors, including the wildlife sector. Natural resources, particularly wildlife resources, are the foundation of many developing countries' economies and a source of livelihood for millions of people.³⁶ Mainstream action, such as adaptation and mitigation, is therefore inevitable. Such action may only be realised by incorporating the climate change agenda into wildlife policies.

This paper is based on the assumption that the strategies for monitoring the impacts of climate change in protected areas in Africa are based on an enabling wildlife policy framework. There is, therefore, a need to review wildlife policy interventions in the face of climate change. Previous studies have analysed the implications of policy and legal mechanisms on climate change in key sectors such as agriculture, water, energy, tourism and the environment in general. However, few studies have focused on the position of international, regional and local biodiversity and/or wildlife legal frameworks under a changing climate situation. This paper focuses on how wildlife policies in East and Southern Africa mainstream climate change adaptation and mitigation approaches.

The paper has been organised in the following way: The first section deals with a literature review on wildlife policy and climate change. This is followed by the methodology used. The section that follows examines how international, regional and selected national biodiversity and/or wildlife policies mainstream climate change. The last section provides conclusions and recommendations on how countries in East and Southern Africa could address critical and increasing climate change threats in the wildlife sector. Knowledge of the climate change agenda in wildlife policy will contribute towards achieving protected area management goals.

WILDLIFE POLICY AND CLIMATE CHANGE

According to the IDS,³⁷ policy refers to a 'statement of intent to achieve desired outcomes'. Wildlife policy, in this context, refers to a deliberate plan of action to guide decisions and achieve rational outcomes.³⁸ Law refers to the formal parameters put in place to guide the utilisation and protection of wild animals.³⁹ Laws can compel or prohibit behaviour through the use of instruments such as permits, penalties and incentives. Assessment of laws, policies and institutional framework (i.e. the acts of parliament and legislation) is therefore necessary to ensure a holistic approach to wildlife management. Loosely, both the policies and legislation can be referred to as policies. A holistic approach is based on the premise that wildlife species are interdependent and that direct and indirect threats to wildlife species have been observed. Modern legislation focuses more on a comprehensive approach to wildlife management that is based on the principle of sustainable use and conservation. The key components in wildlife management include international and regional treaties and conventions, national parks, national legislation and policies, NGOs, private operators, and local communities living adjacent to protected areas. In this review, the term wildlife refers to any animal species, i.e. both vertebrates and invertebrates.

Sustainable wildlife management means the balancing of ecological, economic and social values, with the aim of meeting the future needs of current and future generations.⁴⁰ Generally, East and Southern African colonial wildlife legislation (policies, regulations, permits, directives, strategies, etc.) focus on combating wildlife crime and degradation of wildlife resources. The colonial wildlife management systems have shaped how Africa manages natural resources today. Mapaire⁴¹ noted that most African countries retain colonial elements in their wildlife related legislation and policy making processes, which are almost exclusively western. However, there has been a paradigm shift in wildlife management approaches, from the protectionist approach implemented by colonial administrators during the nineteenth century, towards policies aimed at enhancing local community participation, conservation and sustainability.⁴²

New global challenges have emerged, including climate change, water stress, energy stress, and general biodiversity and ecosystem degradation and loss. Such challenges, particularly climate change, add a complex layer on top of the biodiversity threats that already exist in the wildlife sector. Given the challenges alluded to earlier, climate change can be mainstreamed into biodiversity and/or wildlife management through a variety of tools such as revised laws, regulations, policies, management plans, long-term monitoring and reporting on indicator plant and animal species, adaptive management, trans-boundary cooperation, the involvement of local people, and enforcement of international agreements.⁴³ The Heinz Centre⁴⁴ proposed that strategies for managing the effects of climate change on wildlife and ecosystems should focus on reviewing existing laws, regulations and policies relating to wildlife. This will ensure that these instruments provide wildlife managers with various approaches to addressing the effects of climate change.⁴⁵

The review was based on a holistic approach, in that international biodiversity policies were first examined to see how they have mainstreamed the climate change agenda. This was followed by a scan of sampled regional and national policies and legislation. The next section presents the methodology in terms of how international biodiversity policies, sample regions and country legislation has (or has not) mainstreamed climate change into biodiversity and/or wildlife management.

METHODS AND MATERIALS

This study aimed to answer the following question: To what extent have East and Southern African countries' wildlife policies mainstreamed climate change adaptation and mitigation? This review focused on selected countries in East and Southern Africa. The countries purposefully sampled were Botswana, Kenya, Malawi, Namibia, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.

The countries were sampled based on a number of factors, among them, the viability of the wildlife sector, English speaking, and the availability of the necessary documents online. The study is mainly literature-based and focusses on a number of wildlife policies that have been developed in the sample countries. The policies and legislation reviewed are from both the pre-independence and the post-independence regimes. The retrieved and examined policies and legislation documents are presented in Table 12.1. The authors conducted a scan of selected wildlife related regional policies from the East African Community (EAC) and Southern African Development Community (SADC) blocks, in order to assess whether or not there is mainstreaming of climate change. A keyword word and phrase search was applied to policy and legislative documents using the following words and phrases related to climate change: climate change; adaptation; mitigation; global warming; greenhouse gas emissions. In this review, we did not carry out a detailed analysis or comparison of policies. The major aim was to do a policy audit in order to identify sections in selected wildlife policy documents and legislative instruments that address climate change issues.

Table 12.1: Sample region and country policy documents related to biodiversity and/or wildlife

Country/Region	Policy	Year
Global	• Convention on Biological Diversity (CBD)	1992
	• Convention on Migratory Species (CMS)	1979
	• Convention on International Trade in Endangered Species (CITES)	1973
	• Convention to Combat Desertification (CCD)	1994
	• Ramsar Convention	1971
African Union	• African Convention on the Conservation of Nature and Natural Resources (Algiers Convention)	1969

COMESA	• COMESA Treaty	1994
East African Community	• The Treaty for the Establishment of the EAC Common Market • Protocol on Environment and Natural Resources Management • The Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region • The EAC Development Strategy • Protocol on Sustainable Development of the Lake Victoria Basin	1999 2005 1985 1996 2003
SADC	• SADC Protocol on Conservation and Law Enforcement	1999
Botswana	• Wildlife Conservation Policy • National Biodiversity Strategy and Action Plan	1986 2007
Kenya	• The Wildlife Conservation and Management Act, No. 47, 2013 • Draft Wildlife Policy • National Biodiversity Strategy and Action Plan	2013 2007 2010
Malawi	• Malawi National Parks and Wildlife Act (1992) • National Biodiversity Strategy and Action Plan	1992 2015
Namibia	• Nature Conservation Ordinance 4 of 1996 • The Parks and Wildlife Management Bill of 2005 • National Biodiversity Strategy and Action Plan	1996 2005 2015
Rwanda	• National Biodiversity Strategy and Action Plan	2003
South Africa	• National Environmental Management: Protected areas Amended Act of 2014 • National Environmental Management: Biodiversity Act of 2004 • National Biodiversity Strategy and Action Plan	2014 2004 2005
Tanzania	• The Wildlife Policy of Tanzania • Wildlife Conservation Act • National Biodiversity Strategy and Action Plan	1998 2013 2001
Uganda	• Uganda Wildlife Policy of 2014 • Wildlife Act, Cap 200 of 2000 • National Biodiversity Strategy and Action Plan	2014 2000 2002
Zambia	• Wildlife Policy • Draft Policy for National Parks and Wildlife • The Zambia Wildlife Act • National Biodiversity Strategy and Action Plan	1998 2008 1998 2015
Zimbabwe	• Policy for Wildlife • Parks and Wildlife Act (Chapter 20:14) • Zimbabwe's National Biodiversity Strategy and Action Plan 2013-2020	1992 1991 2013

Source: Authors⁴⁶

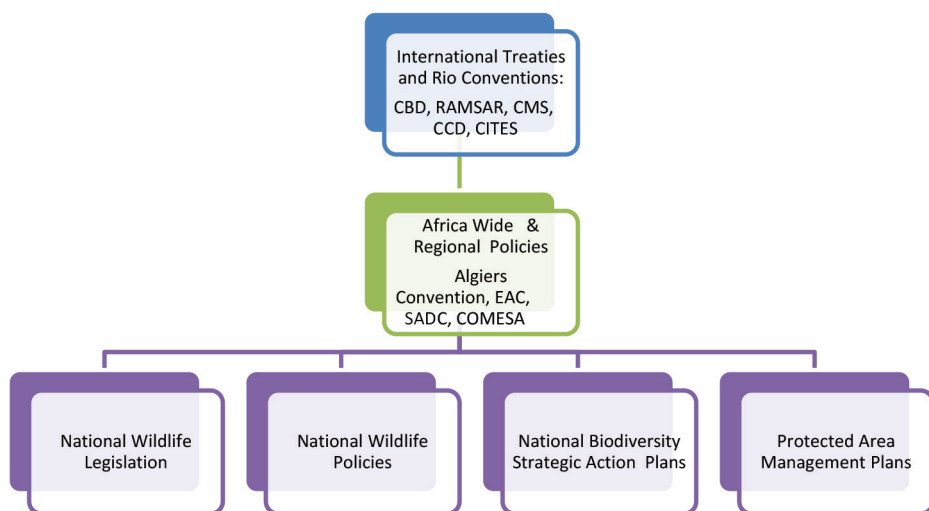
For each policy document, instances with climate change issues were mentioned, were highlighted briefly. Data was then scrutinised, resulting in the identification of case studies and examples where inferences for practical knowledge and capacity development.⁴⁷

RESULTS AND DISCUSSION

This section highlights the findings from our study. Observations from our scan revealed that incorporation of the climate change agenda generally followed the general

international, regional and national legal and institutional policy framework for biodiversity/wildlife management (Figure 12.1).

Figure 12.1: Framework for incorporation of climate policy into biodiversity and/or wildlife management



Source: Authors⁴⁸

Based on the framework for incorporation of climate change policy in the biodiversity/wildlife sector (Figure 12.1), findings on how international, regional and national wildlife policies mainstream climate change adaptation and mitigation are presented in the sections that follow.

INTERNATIONAL BIODIVERSITY AND/OR WILDLIFE POLICY AND CLIMATE CHANGE

This review identified two broad approaches to the development of biodiversity and/or wildlife conservation legislation, i.e. species based and area based international, regional or local initiatives. International legislation for biodiversity conservation issues are broadly addressed under the Convention on Biological Diversity (CBD). The CBD was signed in 1992 and is now ratified by most countries.⁴⁹ The main objectives of the CBD are to achieve the ‘conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from the utilization of biological diversity’.⁵⁰ The CBD and UNFCCC acknowledge that ecosystems perform key functions in the global carbon cycle and in adaptation to climate change, therefore it is essential to conserve them. Since 1992, the CBD has held 12 COP sessions. The COPs have made

several decisions related to biodiversity and climate change adaptation and mitigation (Table 12.2).

Table 12.2: CBD COP decisions on biodiversity and climate change

COP event	Venue and date	COP decision related to biodiversity and climate change adaptation and mitigation
COP 1	Nassau, Bahamas, 28 November - 9 December 1994	Nil
COP 2	Jakarta, Indonesia, 6-17 November 1995	Nil
COP 3	Buenos Aires, Argentina, 4-15 November 1996	Nil
COP 4	Bratislava, Slovakia, 4-15 May 1998	Nil
COP 5	Nairobi, Kenya, 15-26 May 2000	Nil
COP 6	The Hague, Netherlands, 7-19 April 2002	Nil
COP 7	Kuala Lumpur, Malaysia, 9-20 February 2004	Decision VII/15: Biodiversity and Climate Change, Article 12: encourages parties to take measures to manage ecosystems so as to maintain their resilience through extreme climate events and to help mitigate and adapt to climate change.
COP 8	Brazil, 20-31 March 2006	Decision VIII/30: Biodiversity and climate change: guidance to promote synergy among activities for biodiversity conservation, mitigating or adapting to climate change and combating land degradation.
COP 9	Bonn, Germany, 19-30 May 2008	Decision IX/16: Biodiversity and Climate Change, Annex II: Indicative list of activities by parties to promote synergies among the Rio Conventions (related to climate change adaptation): Augment the incorporation of biodiversity and desertification/ land degradation issues in climate change adaptation planning. Adopt the ecosystem approach to promote deliberations on the benefits of cross-sectoral planning in climate change adaptation. Assess, where appropriate, the degree to which biodiversity and desertification/land degradation issues are incorporated into current climate change adaptation plans. Recognise areas that are vulnerable to the impact of climate change, particularly high biodiversity levels and biodiversity threats, depending on national capacity and the availability of finance.
COP 10	Nagoya, Japan, 18-29 October 2010 Decision 33 Biodiversity and Climate Change	Decision X/33: Biodiversity and Climate Change, Article 8: provides guidance on ways to conserve sustainably use and restore biodiversity and ecosystem services while contributing to climate-change mitigation and adaptation through: Evaluation of the impacts of climate change on biodiversity Ecosystem based approaches for adaptation and mitigation Reducing climate change impact on biodiversity through mitigation and adaptation measures.

COP 11	Hyderabad, India, 8-19 October 2012	Decision XI/19: Biodiversity and climate change related issues. Advice is provided on: the application of relevant safeguards for biodiversity with regard to policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. Decision XI/21: Biodiversity and climate change: integrating biodiversity considerations into climate-change related activities.
COP 12	Pyeongchang, Republic of Korea, 6-17 October 2014	Decision XII/20: Biodiversity and climate change and disaster risk reduction: COP recognises that biodiversity and ecosystems are vulnerable to climate change and that the conservation and sustainable use of biodiversity and the restoration of ecosystems can play a significant role in climate change mitigation and adaptation, thereby combating desertification and disaster risk.

Source: Adapted from CBD⁹¹

Species based international agreements include the Washington Convention of 1973 (also known as the Convention on International Trade of Endangered Species (CITES) and The Bonn Convention on the Protection of Migratory Species (CMS) 1993.⁵² CITES is an international agreement between governments to ensure that international trade in wildlife species is monitored and controlled, in order to prevent wildlife species becoming extinct.⁵³ CITES regulates or prohibits commercial trade in globally endangered species or products made from these species,⁵⁴ thereby protecting wildlife species against overexploitation through international trade. Regulation of wildlife trade is implemented according to three appendices that list categories of species regulated under the terms of the treaty.⁵⁵ The CMS is concerned with the adoption of protection measures to conserve populations and the habitats of migratory animal species, particularly wild animals that migrate across or outside national jurisdictional boundaries.⁵⁶ Findings from the scan of these international conventions revealed that neither of these conventions make direct mention of terms related to climate change adaptation or mitigation.

Area based international agreements and climate change includes the Ramsar Convention on Wetlands of 1971⁵⁷ and the Convention to Combat Desertification (CCD).⁵⁸ The Ramsar Convention on Wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation on conservation and wise use of wetlands and their resources.⁵⁹ The CCD was launched in 1994 as one of the outcomes of direct recommendations made at The Rio Conference of 1992 and stipulated in Agenda 21.⁶⁰ Van Dyke⁶¹ noted that:

the Convention to Combat Desertification (CCD) was established to reduce the process of desertification, mainly by adopting measures to protect dry land environments and improve the living standards of people who use them through improving livestock and forestry practices, land use reform, soil and water conservation, and wildlife protection.

Unlike the CCD, the Ramsar Convention directly recognises the value of wetlands in climate change mitigation and is obliged to contribute towards emerging information and events related to climate change and wetlands.⁶²

REGIONAL BIODIVERSITY POLICIES AND CLIMATE CHANGE

Eastern and Southern African countries have developed specific laws and policies on wildlife that define political and strategic arrangements relating to wildlife management. These laws are usually developed in line with subregional, regional or international laws. Most of these countries have therefore ratified some of the international treaties and conventions related to biodiversity management. The African Convention on the Conservation of Nature and Natural Resources (ACCNNR), also known as the Algiers Convention, is one of the key regional frameworks that were adopted by the Organisation of African Unity (OAU) at its fifth ordinary session, held in Algiers on 15 September 1968.⁶³ The Algiers Convention was signed by 38 states and ratified by 30 African states as a basis for the efforts to be taken by newly independent African nations to conserve their environment and natural resources.⁶⁴ The adoption of the Convention coincided with the United Nations General Assembly's (UNGA) decision to convene the United Nations Conference on the Human Environment (UNCHE), which was subsequently held in 1972 in Stockholm.⁶⁵ The African Convention is also similar to UNCHE in its focus, because it addressed what was termed first-generation environmental problems, which deal with resources such as soil, water, flora and fauna. Second-generation problems relate to ozone depletion, climate change and loss of biodiversity in Africa.⁶⁶ However, the text of the Algiers Convention does not directly mention climate change adaptation and mitigation matters.

EAST AFRICAN COMMUNITY WILDLIFE POLICIES AND CLIMATE CHANGE

The EAC has developed policies and institutions for wildlife management. Key policies responsible for wildlife governance in the EAC are the East African Community Protocol on Environment and Natural Resources and the Protocol Concerning Protected Areas and Wild Fauna and Flora in the Eastern African Region. As revealed by the frequency counts. The EAC Protocol on Environment and Natural Resources includes a number of clauses addressing climate change mitigation and adaptation, either directly or indirectly. Article 3 (q) includes mitigating the effects of climate change as part of the scope of the protocol.⁶⁷ The issue is further explained under Article 24, Mitigating Effects of Climate Change; this stipulates that all member states shall 'develop and harmonise their laws, policies and strategies for mitigating the effects of greenhouse gas emissions and the manner and procedures for benefiting from the Clean Development Mechanism under the Kyoto Protocol and other similar climate change adaptation and mitigation activities and strategies'.⁶⁸ The EAC Protocol Concerning Protected Areas and Wild Fauna and Flora was signed in Nairobi in 1985 and entered into force in 1996. The protocol requires

the development of national strategies to coordinate the protection and preservation of fragile ecosystems (Article 2).⁶⁹ The protocol does not include the term climate change.

SADC WILDLIFE POLICIES AND CLIMATE CHANGE

Climate change has become such a threat in the SADC region that different structures and political leaders are increasingly paying attention to the issue.⁷⁰ The region has taken steps to deal with climate change by developing policies, strategies and programmes. The SADC Protocol on Conservation and Law Enforcement (1999) places emphasis on sustainable use and conservation of wildlife, as well as law enforcement.⁷¹ The protocol requires countries to:

- i. facilitate the exchange of information concerning wildlife management, utilisation and the enforcement of wildlife laws and assist in the building of national and regional capacity for wildlife management, conservation and enforcement of wildlife laws;
- ii. promote the conservation of shared wildlife resources through the establishment of transfrontier conservation areas; and
- iii. facilitate community based natural resources management practices for management of wildlife resources.⁷²

Although the protocol serves to promote the sustainable use of wildlife and play an important role in the protection of the endangered and threatened species of the specially protected fauna and flora, it does not address issues related to climate change. This observation is supported by Lesolie,⁷³ who suggests that SADC must prioritise the mainstreaming of climate change considerations in development planning in the wildlife sector. Lesolie⁷⁴ further reiterates that the SADC region should also address the impacts of climate change through the successful implementation of adaptation and mitigation interventions designed to enhance economic and social resilience.

COMESA AND CLIMATE CHANGE

The Common Market for Eastern and Southern Africa (COMESA), a regional organisation of 19 sovereign African member states, was established in 1994.⁷⁵ The community is composed of the following East and Southern African countries: Burundi, Comoros, Democratic Republic of Congo (DRC), Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Swaziland, Uganda, Zambia and Zimbabwe. Although the COMESA agreement devotes article 126 to wildlife development and management,⁷⁶ it does not directly mention the term climate change. However, in 2011, the community developed the COMESA Climate Change Initiative, which contains a mandate to address climate change and its

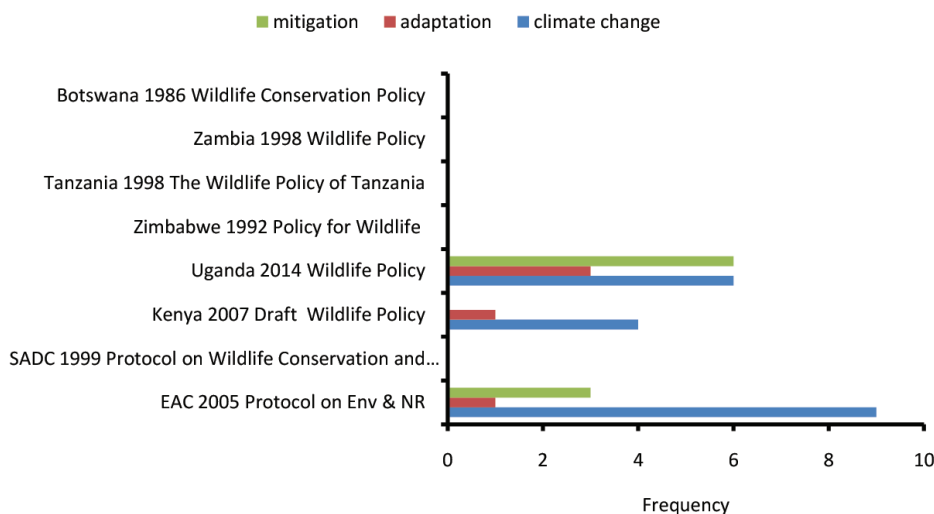
impacts in a manner that builds economic and social resilience for present and future generations.⁷⁷

Findings from the review of international and regional documents reveal that although the text of the convention does not mention any climate change related terms, since 2004, the CBD has been committed to addressing the climate change agenda. However, other key biodiversity related pieces of legislation, such as CITES, CCD and CMS do not address climate change issues. East African regional biodiversity related policies have also made an effort to address the climate change agenda, but the Southern region, particularly SADC, is yet to mainstream climate change issues.

NATIONAL WILDLIFE LEGISLATION AND CLIMATE CHANGE

In order to establish whether or not biodiversity and/or wildlife policies mention the relevant climate change words and/or phrases, a scan was completed on selected policy documents. An analysis was made to obtain frequency counts and the findings are presented in Figure 12.2.

Figure 12.2: Frequency count for the key word and key phrases search



Source: Authors⁷⁸

It emerged that The EAC Protocol on Environment and Natural Resources management has the highest count for the term 'climate change' (nine). This is followed by Uganda Wildlife Policy and then Kenya Wildlife Policy, with six and four mentions, respectively. The other policies do not mention the term 'climate change'.

A number of EAC countries have good policies and institutions for wildlife management and have a high number of well established protected areas. Uganda, for example, formulated her first written wildlife policy in 1994 alongside other sectoral policies.⁷⁹ The country reviewed the policy in 2014, so as to facilitate alignment with other key sectoral policies, thereby enabling national transformation.⁸⁰ Progressive countries like Uganda and Kenya have recently put in place new generation legislation and climate response strategies that are intentional about the desire to address climate change adaptation in their wildlife sectors. On the other hand, most countries in the SADC region are still lagging behind in terms of mainstreaming the climate change agenda in their wildlife legislation. The Uganda Wildlife Policy of 2014 shows how the country has mainstreamed the climate change agenda into its wildlife management systems. Box 12.1 summarises the provisions for climate change in wildlife policies in Ugandan wildlife policies.

Box 12.1: Provisions for climate change adaptation and mitigation in Uganda Wildlife Policy 2014⁸¹

Section 1.5: Adaptive responses to such new challenges as climate change (p.12).

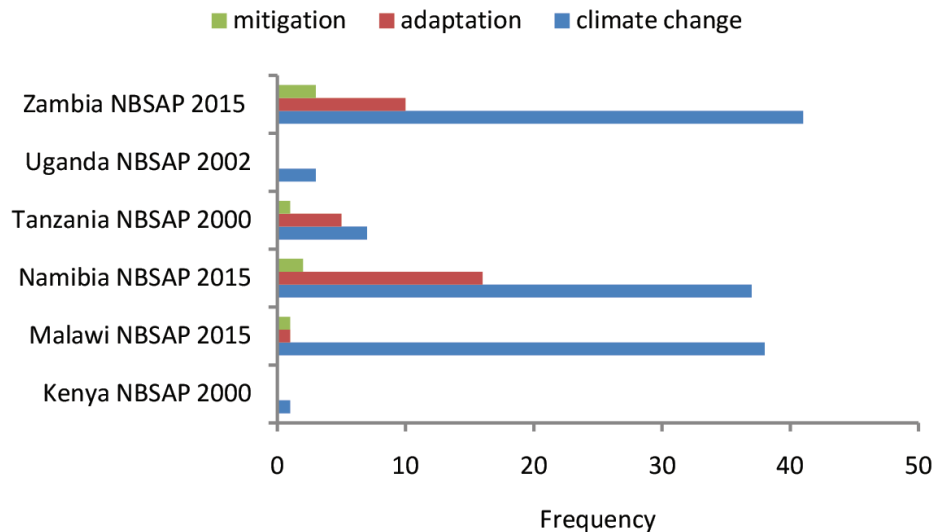
Section 1.7: It mentions one of the cross-cutting issues as being 'negative impacts of climate change on wildlife populations and habitats' (p.14).

Section 2.1(8) is solely dedicated to addressing climate change mitigation and adaptation – 'the wildlife policy shall promote climate change awareness, mitigation and adaptation' (p.15).

Kenyan wildlife is governed by The Wildlife Conservation and Management Act, No. 47, 2013.⁸² The Act highlights that the national wildlife conservation and management strategy shall prescribe the principles, objectives, standards, indicators, procedures and incentives for the protection, conservation, management sustainable utilisation and control of wildlife resources. Sections (n) and (j) indicate the provisions for addressing climate change issues in the wildlife sector. Section (n) states 'adaptation and mitigation measures to avert adverse impacts of climate change on wildlife resources and its habitats';⁸³ section (j) highlights the need to 'give information on early warning, disaster management, impacts and mitigation and adaptive strategies to climate change in wildlife conservation areas'.⁸⁴ The Kenya National Biodiversity Strategic Action Plan (NBSAP) only highlights climate change as one of the major threats to biodiversity.

Other countries in the EAC, such as Tanzania, do not have a provision for climate change adaptation and mitigation in terms of wildlife legislation and policies. The same applies to countries in Southern African that include Malawi, Namibia, South Africa, Zambia and Zimbabwe. However, all the countries in the Eastern and Southern Africa block that were sampled have developed a comprehensive National Biodiversity Strategic Action Plan (NBSAP), which addresses climate change adaptation and mitigation measures. A quick frequency count in this regard confirms this claim (Figure 12.3).

Figure 12.3: Frequency count for key words and key phrases related to climate



Source: Authors⁸⁵

There seems to be a policy gap in terms of incorporating and translating national climate change policy into sectoral policies and laws. For instance, although Zimbabwe's National Biodiversity Strategy and Action Plan (2013-2020) addresses climate change issues, but the Parks and Wildlife Act (Chapter 20:14) does not provide for climate change adaptation and mitigation measures in the designated protected areas. The Act regulates all categories of protected areas in Zimbabwe (i.e. national parks, recreational parks, botanical reserves and botanical gardens, sanctuaries and safari areas) and confers overall responsibility for management of all wildlife resources (i.e. wild animals, fisheries and other resources) to the Parks and Wildlife Management Authority.⁸⁶

From this audit, it emerged that there are two sets of legislation concerning the mainstreaming of climate change into wildlife management legislation. We came up with the terms 'old' and 'new' generation legislation. Old generation policies are mainly those written prior to 2010 and such legislation makes little or no reference to mainstreaming climate change into wildlife management. The new generation legislation and policies are mainly those prepared from 2010 onwards, but this does not necessarily mean that all legislation written since 2010 are compliant in terms of mainstreaming climate change. Some still make no reference to the subject matter under discussion.

CONCLUSIONS AND RECOMMENDATIONS

This review highlighted how biodiversity and/or wildlife policies mainstream climate change adaptation and mitigation strategies in selected East and Southern African countries. The major findings are that most countries in East and Southern Africa have not mainstreamed climate change adaptation and mitigation strategies into their wildlife policies. However, progressive countries like Kenya and Uganda have taken steps to include the climate change agenda in their wildlife policies. Although the climate change agenda has been in place for more than two decades now, most countries in East and Southern Africa have not mainstreamed climate change in their wildlife policies. Thus, wildlife legislation in East and Southern Africa can be divided into old generation and new generation approaches. The wildlife sector should develop new legislation and regulations as needed to provide managers with the flexibility, tools and approaches needed to effectively address climate change.

Our research findings further demonstrate that key international biodiversity and conservation related policies do not directly mainstream climate change. However, the leading biodiversity convention, CBD, has a platform to integrate biodiversity considerations into international climate change policies, thereby creating synergies/linkages between biological diversity and climate change. Regional policies, in particular EAC, has taken steps to mainstream biodiversity/wildlife issues into climate policies. The Southern Africa region has not mainstreamed climate change agenda in biodiversity/wildlife policies; neither do the climate policies mention biodiversity and/or wildlife issues. Future studies are required that focus on reviewing wildlife related institutional programmes and projects for selected countries.

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Tourism and Climate Change

Challenges and Critical Success Factors for Sub-Saharan Africa

Sarudzai Mutana

ABSTRACT

Worldwide, there is increasing awareness of the importance of climate change for tourism sustainability. However, detailed information and understanding in this regard is still limited, as are effective and practical methods of climate change mitigation and adaptation pertaining to the sector, especially in Sub-Saharan Africa (SSA), where tourism is an important economic sector for many countries. The tourism industry in SSA is considered 'climate sensitive', because most of its activities are nature based and climate change is thus a notable threat to the industry. Climate change has been acknowledged as one of the factors with the highest potential to alter the way people travel in future and the industry will have to adapt to the new situation. This chapter uses critical discourse analysis to show the gap in research on the feasibility of climate change mitigation and adaptation in SSA, in view of the competing needs in the region. It seeks to point out the critical success factors for aiding climate change mitigation and adaptation in the tourism industry in SSA. The chapter argues that, whereas adaptation and mitigation in the tourism sector is an urgent activity, many SSA countries lack a systematic strategy for mainstreaming, following through and empowering key players in terms of adaptation and mitigation policy systems, especially in view of the competing needs for funding in most of the countries under review.

INTRODUCTION

There is increasing awareness of the importance of tourism for economic development in SSA, where the industry is regarded as a key alternative to mining and agriculture.¹ United Nations World Tourism Organisation (UNWTO) has determined that tourism is a primary source of foreign exchange earnings in most least developed countries (LDCs).² The World Bank has classified the majority of Sub-Saharan countries as LDCs, except South Africa.³ In many SSA countries, tourism contributes on average 11 per cent to gross

domestic product (GDP) of these countries and generates considerable levels of employment.⁴ United Nations Environment Programme (UNEP) argues that tourism has the capacity to reduce poverty among communities through the entrepreneurial opportunities it provides.⁵ Poverty alleviation is at the centre of the international development agenda.⁶

However, this industry is under threat from different sources, including the global recession, security and climate change.⁷ Tourism has a close connection to the environment and is considered to be highly climate sensitive, in a similar fashion as with agriculture, insurance, energy and transportation.⁸ Climate change is described as 'the permanent departure of climate patterns from mean values of observed climate indices'.⁹ Climate change could be a major driver of the extinction of undocumented species, migrating species and resident species, which could affect the appropriate and adequate functioning of ecosystems.¹⁰

Ngaruiya¹¹ suggests that climate change could cause social vulnerability in internal properties of society or people to reduce the attractiveness of the area and lower tourism activity, and consequently the related income streams. Available evidence shows that tourists have the freedom to choose to avoid those destinations that show the negative impacts of climate change.¹² Furthermore, there is evidence that tourism contributes to the climate change phenomenon through the emission of greenhouse gases (GHGs), which contribute to global warming and lead to climate change.^{13,14} The tourism sector uses fossil based fuels in transporting tourists from the generating regions to the destination, within the destination and back to the generating region.¹⁵ The sector contributes up to five per cent of global anthropogenic emissions of carbon dioxide, and even higher percentages in important tourism destinations.¹⁶ This contribution is likely to increase as tourism activities increase around the world.

As many SSA countries continue to exploit tourism for economic benefit, issues relating to climate change management have not been given adequate attention in terms of development policies for the sector. SSA has a unique tourism offering that is heavily reliant on wildlife.¹⁷ One can argue that the strongest brand in overseas travel to Africa is Africa itself. The region is believed to be the custodian of the biggest proportion of the world's animal and plant species. This fact strategically positions tourism in SSA as one that will continue growing.

Awareness about sustainable tourism is increasing among tourists.¹⁸ Climate change is regarded as one of the key challenges to sustainable tourism. There is thus a need to put in place mitigation and adaptation measures, in order to reduce the possible impact of climate change on tourism. This is notwithstanding the increase in knowledge about the impact of climate change on the world economy, which will eventually result in some governments coming up with additional strategies to both mitigate and adapt to climate change in other sectors of the economy. It has been observed that although some SSA countries have enacted climate change mitigation strategies (which are generic in nature for all industries), uptake and implementation of these strategies by the tourism industry has been slow. The industry has not yet shown signs of adapting to the changed and

changing climate, although there is acknowledgement that the effects of climate change are being felt.

This chapter is a result of critical discourse analysis of the available literature on tourism and climate change mitigation and adaptation in SSA and has two objectives. Firstly, it uses this literature to illuminate the implications of climate change for tourism in SSA and the action that is necessary to adapt and mitigate the industry to climate change. Secondly, it applies the Critical Success Factors (CSFs) theoretical framework to suggest that a sense of urgency is needed in key areas related to mainstreaming adaptation and mitigation of climate change, and that this should be reflected in the way that governments and the private sector approach the issue. It is concluded that whereas many SSA countries have come up with climate change response strategies, the policies have concentrated on mitigation measures and lack the hierarchical cascading effect that should draw from different industry sectors in these countries. It is necessary that tourism development planning gives the necessary attention to adaptation of the sector, if the industry is to be sustainable in SSA.

RESEARCH METHODOLOGY

The author used critical discourse analysis as the methodology for collecting and analysing the available and accessible literature on climate change mitigation and adaptation responses of the tourism sector in SSA. The key sources of information were journal articles available on academic databases, for example, Google Scholar, and Taylor and Francis Online. Publications by key international organisations on climate change, for example, UNEP, UNFCCC, the Intergovernmental Panel on Climate change (IPCC) and UNWTO, were also analysed, particularly for reports on SSA and country responses to climate change. Key search words and phrases were used to generate the relevant articles from the databases, i.e. climate change; tourism and climate change; climate change mitigation and adaptation; climate change adaptation in SSA. The pearl growing technique of locating articles used as references by other writers was also used to increase the number of articles included in the analysis. The purpose of this analysis was to identify the key themes of discussion by researchers on key challenges for mitigation and adaptation responses of the tourism sector to climate change in SSA. The CSFs theoretical framework was then applied to point out some key issues that need constant attention in the tourism sector, if the industry is to successfully mitigate and adapt to climate change.

The CSFs concept was first suggested by Ronald Daniel¹⁹ in the 1960s, but was later popularised by Professor John Rockert of Sloan Business School, in 1979.²⁰ It was Rockert who first used the term 'Critical Success Factors'. The concept originated in strategic management field of study, where the argument was that every manager should have a limited number of explicit factors that should happen 'right', in order for that manager to achieve his/her objectives.²¹

The concept of CSFs has been applied in tourism research by a number of authors, especially in terms of destination marketing,^{22,23} but it has not yet been applied in studies to do with the mainstreaming of climate change mitigation and adaptation strategies.

TOURISM AND CLIMATE IN SUB-SAHARAN AFRICA

In SSA, tourism is a key economic sector. SSA countries that realise important economic returns from tourism include Zimbabwe, South Africa, Tanzania, Mozambique, Botswana, Swaziland, Namibia, Seychelles, Madagascar, Lesotho, Kenya, Zambia, Malawi and Mauritius. In all of these countries, tourism is regarded as a key contributor to development.²⁴ However, the industry is under threat from climate change.

In 1989, Dieke posited the controversial notion that SSA regards tourism as 'manna from heaven', i.e. that it brings unprecedented opportunities to the countries' economies.²⁵ This view implied an industry that brings benefits, but is devoid of any challenges and negative impacts. Empirical evidence has shown that this view is not reflective of the realities of the tourism industry. Nevertheless, in SSA, tourism remains an important source of economic development and plays a role in the alleviation of poverty. Nature based tourism is the fastest growing segment of tourism worldwide, especially in developing countries.²⁶ Although statistics on the contribution of the nature based tourism sub-sector are scarce, in 2006, nature based tourism was estimated to have generated some US\$3.6 billion in SSA.²⁷ This revenue is equal to the combined revenues from farming, forestry and fisheries.²⁸ Some of the key tourism attractions in the region include: Cape Town (South Africa) with its proximity to the Indian and Atlantic Oceans; Table Mountain (South Africa); Caprivi Strip (Namibia); Victoria Falls (Zimbabwe); Lake Malawi (Malawi); Okavango Delta (Botswana); Bazaruto Archipelago (Mozambique); Garden Route (South Africa); South Luangwa National Park (Angola); Chobe National Park (Botswana).²⁹ An overarching characteristic of all the tourism attractions in the region is that they rely heavily on nature and further developments in climate change will result in negative effects on most of them.

The IPCC³⁰ confirms that there is indisputable warming of the climate system. Climate change is described as a change in climate that is directly associated with human activity that changes the atmospheric composition in a way that is different from the natural climatic changes that are expected to be observed over time.³¹ The definition provided by United Nations Framework Convention on Climate Change (UNFCCC) distinguishes between changes resulting from natural causes and those caused by human activities. The IPCC argues that most of the changes in climate observed between 1850 and 2005 are very likely to be the result of human activities, which are increasing the level of GHGs in the atmosphere. The IPCC posits that the pace of climate change is likely to accelerate, as evidenced by the continued increase in surface temperatures, which it is estimated will rise by 1.8-4 degrees Celsius by the end of the twenty-first century.³² Events that will show the

existence of climate change include the increased prevalence of tropical cyclones, which will be more intense, as well as reduction in snow cover. It is argued that climate change is one of the key factors that is likely to affect the tourism sector in the next 15-30 years.³³ In fact, Hall believes that the significance of climate to destination viability cannot be underestimated due to its potential influence on the viability of tourism activities.³⁴ This is because climate change will determine the attractiveness of the destination and will exert a direct and an indirect influence on the tourists' decision-making about whether or not to visit a specific destination.

The World Bank has indicated that the Sub-Saharan region's tourism sector is highly sensitive to climate change.³⁵ This is reiterated by Novelli, who recognises climate change as a challenge or 'bottleneck' for achieving sustainable tourism in the region.³⁶ For instance, the European Union Emission Trading Scheme (EU ETS) has included the aviation sector in the new legislation on emissions.³⁷ This development (among other effects) has a direct impact on the very foundation upon which tourism development in Africa is built, i.e. aviation as a means of reliable transport to move tourists over long distances. Furthermore, changes in global climate change policy have resulted in an increased focus on the type and cost of fuel used to transport tourists,³⁸ which suggests the urgency for greening the tourism sector and designing carbon neutral destinations. One important implication of these and other developments is that tourism planning should make environmental management a key component of its sustainability plans, especially in sensitive or protected areas where significant tourism activity takes place.

Climate change has been described as the twenty-first century's most enduring problem, with real impacts that need urgent and decisive action to address them.³⁹ Severe climatic impacts are projected and SSA is among the most vulnerable parts of the world.⁴⁰ There is evidence that SSA has experienced a higher increase in daily temperature compared to the global average.^{41,42} The mean annual temperatures have risen by at least 1.5 times the global average, with increased rainfall events.⁴³ There has also been a noticeable increase in the level of dryness across the SSA region as a result of delays in the onset of rainfall seasons and increased cases of drought, floods, intense hot spells and wild-fires.⁴⁴ These developments raise concerns regarding loss of biodiversity, which is central to tourism development, thereby threatening the viability of the tourism sector. High levels of poverty in SSA have also exacerbated the impact of climate change, resulting in more conflict associated with equitably sharing available resources between communities and tourism organisations. For example, in Kenya, climate change has been evidenced by extreme weather conditions resulting in more droughts and higher temperatures.⁴⁵ This has affected the natural and social systems of many communities negatively. The drying of one of the (previously) perennial rivers in the Nairobi National Park has resulted in the death of crocodiles, hippo and fish and has threatened the survival of many other species that relied on the river for water.⁴⁶ Some of these animals are important for nature based tourism, which is a key subsector of the Kenyan tourism sector. Nairobi National Park contributes approximately 70 per cent of Kenya's tourism income.

The impact on tourism will therefore leave a visible dent in the Kenyan economy. In Zimbabwe, the impact of climate change has been and continues to be felt, with drought becoming common and the animals in the Hwange National and Gonarezhou Parks being affected most. In South Africa, a number of the iconic attractions have also felt the impact of climate change. Some of the places that have been investigated recently include Robben Island, Table Mountain, the Kruger National Park, coastal beaches and marine attractions.⁴⁷ The adverse effects of climate change that have been identified include loss of biodiversity, a possible reduction in the quality of tourism products, and a possible reduction in the number of tourists visiting nature based destinations.⁴⁸ This is alarming, considering that most SSA governments have earmarked tourism as a key economic sector for development.⁴⁹ These cases reflect the situation in most SSA countries.

IMPACT OF CLIMATE CHANGE ON TOURISM

Climate is the key resource for tourism, due to its ability to determine the suitability of destinations for a range of tourist activities. Climate is also the driver of global seasonality in tourism demand. The seasonal climate differences between tourist generating and tourist receiving regions are key considerations that influence decision-making about travel.⁵⁰ Climate also has a major influence on costs associated with heating, cooling, snowmaking, irrigation, food and water supply to supporting a viable tourism sector.⁵¹ These extra costs will increase the cost of providing tourism services, hence having a bearing on the price of services. This has the potential to negatively affect demand for SSA tourism products, some of which are already considered to be expensive compared to those in other regions, especially America and Europe.

Climate change results in uncertainty regarding the seasonal distribution of tourists in destinations.⁵² Climate change affects the length of seasons. For example, winter sport activities on the Drakensberg Mountains in South Africa and Mt Kilimanjaro in Tanzania are limited to three months of the winter season, i.e. May to July. A change in length and quality of these winter months will render climate dependent tourism activities vulnerable. This will determine the competitiveness of these tourism destinations.

Climate change affects tourism through increased infrastructure damage from adverse weather events (natural disasters). This results in the need for additional emergency preparedness, higher operating expenses and backup water systems (among others).⁵³ All these contribute to the cost of delivering a tourism service in an area. Climate change also has an indirect impact on tourism. Extreme weather events may lead to infrastructure and other damage that reduces the aesthetics of the landscape of a tourism area. In addition to damage to constructed and natural infrastructure, climate change may lead to changes such as vector-borne diseases (e.g. malaria) in tourist regions previously not affected by such diseases. This may result in reduced tourist arrival figures in the affected areas.

Despite this and other suggested impacts of climate change on tourism, there is still a considerable knowledge gap regarding the nature of climate change impacts on some natural and cultural resources that are critical for tourism.⁵⁴ Identifying these and adapting them to the present effects of climate change is as important as mitigating further climate change that may worsen the current situation.

CLIMATE CHANGE ADAPTATION AND MITIGATION IN SUB-SAHARAN AFRICA: IMPACT ON TOURISM

The foregoing discussion indicates an urgent need for the SSA tourism industry to mitigate and adapt to climate change. Climate change mitigation includes all efforts intended to reduce or prevent the emission of GHGs into the atmosphere.⁵⁵ It can also mean the use of new technologies and renewable energy forms to increase the efficiency of older equipment, as well as changing management practices and influencing consumer behaviour.⁵⁶ Adapting to climate change is a phrase that encompasses all the expected alterations that humans need to effect in response to experienced or expected changes in climate, in order to curb the negative effects and take advantage of any opportunities arising from such change.^{57,58}

Whereas there is abundant literature on climate mitigation strategies designed for implementation in many SSA countries, there is a paucity of analysis on the level of success in mainstreaming these policies. This paucity is exacerbated by the lack of empowerment of the key players who should evaluate the implementation of these policies at grassroots levels. Also lacking is literature on adaptation strategies. Available literature tends to be skewed towards climate mitigation. The scanty literature that is available on climate change adaptation is largely focused on urban municipalities and is without reference to how tourism operations can be adapted to climate change in these areas.⁵⁹ As a result, there is currently a lack of clarity on what tourism industry players should do in order to adapt their organisations to the effects of climate change.

It is therefore argued in this chapter that, while climate mitigation has already been considered in some countries in SSA, this needs to be followed through with implementation, especially by empowering local government officials, who are mandated with the responsibility to implement the policies. In addition, the previously side-lined climate change adaptation focus also needs to be given the critical attention it deserves. The ensuing part of this chapter discusses some of the challenges associated with specific mitigation and adaptation strategies suggested in some of the available literature on the discourses.

THEORETICAL FRAMEWORK

This part of the chapter will be analysed in terms of the CSF concept.⁶⁰ The concept states that CSFs are key areas that a manager should give constant attention to in order to ensure the realisation of set work objectives.⁶¹ Three characteristics of the CSF theoretical framework will be applied in analysing the subject of climate change mitigation and adaptation in SSA.

The first characteristic is that CSFs are strategic areas which require satisfactory results to ensure competitive performance by an organisation or an individual.⁶² The second characteristic is that each manager should work with his or her own CSFs. Hence CSFs should be tailored to the unique situations of each manager. Third is that CSFs are hierarchical in nature.⁶³ An individual manager's CSFs should flow from the organisation's CSFs, but will differ from the CSFs of other managers in the same organisation because of differences in the managers' circumstances and roles.⁶⁴ The ensuing part of this discussion will point out CSFs in mitigation and adaptation to climate change in SSA.

CHALLENGES RELATED TO CLIMATE CHANGE MITIGATION

A number of SSA countries have come up with climate mitigation policies that have an implication for tourism growth. South Africa, Zimbabwe, Kenya, Botswana and Namibia are among the SSA countries that have included environmental management and climate change as part of their key policies. In 2015, Kenya published its National Climate Change Response Strategy (NCCRS).⁶⁵ The climate change response strategy for South Africa was first mentioned in the 1996 Tourism White Paper, where climate change was identified as a key area needing close attention going forward.⁶⁶ By 2004, the Department of Environmental Affairs and Tourism had designed a strategy for the tourism industry.⁶⁷ Botswana had mainstreamed green tourism into the hotel registration guidelines by 2014, although this was still on a voluntary basis.⁶⁸ One key activity for climate change mitigation is the protection of carbon sinks such as forests and oceans, as well as the creation of new carbon sinks through silviculture or green agriculture. Some of these policies and efforts have been implemented in conjunction with the private sector and non-governmental organisations (NGOs). For example, the work of Reducing Emissions from Deforestation and Forest Degradation plus (REDD+) is active in South Africa, Zimbabwe, Zambia, Botswana and Namibia, where the state of forests is important for tourism, which relies heavily on nature and especially on healthy habitats for wild animals.⁶⁹ The mitigation strategy that mainly targets the preservation of forests awards carbon credits for improvement in the state of forests, which are instrumental in maintaining a suitable habitat for wild animals. This project aims at helping communities to protect their forests, which helps in improving the habitats for the biodiversity needed for tourism activity.

Policies on greening the tourism sector are also seen in a number of countries. Botswana has adopted an ecotourism grading system that has been mainstreamed to become part of the licensing process of all new tourist facilities.⁷⁰ This system makes it mandatory for every new tourist facility to meet the basic green tourism criteria, while those that exceed the basic criteria are certified as being 'Green'.⁷¹ In Namibia, the government has a Green Plan, which is a policy on ecotourism that is based on the argument that most tourism in Namibia is nature based and happens in fragile environments like the swamp and dessert.⁷² Greening refers to all efforts to make the operations environmentally friendly. The term arises from the concept of a green economy, which was popularised by the 2008 global financial crises.⁷³ The essence of the green economy incorporates aspects that have long been side-lined by most tourism organisations, for example, alleviation of poverty, the use of renewable sources of energy, gender balance, the equitable use of natural resources, the protection of water bodies, the creation of green jobs for the youth, sustainable waste management, and sustainable consumption of resources.⁷⁴ It is a subset of sustainable development, which emphasises the need for industry to consider the social responsibility of helping the poor and creating jobs.⁷⁵

Although the tourism sector needs to be greened, available evidence shows that certain indicators of a green industry (for example, poverty alleviation), are not at the heart of the current tourism agenda. This poses a challenge in SSA, where many communities are poor and share resources with tourism for their day-to-day survival.⁷⁶ It is critical that climate mitigation strategies recognise this tug-of-war and examine how tourism development policies can mainstream the creation of green jobs and alleviate poverty. The evidence also shows that conflict about natural resource is amplified by climate change and can also contribute to the negative impact of climate change.⁷⁷ For example, illegal hunting of wildlife, poaching of wood products, uncontrolled veld fires and illegal settling in protected areas, all have the potential to increase the loss of biodiversity. These poverty related issues, if not addressed, will weaken the climate change mitigation efforts suggested in the policies established by governments.

One of the critical issues suggested for climate change mitigation is carbon neutrality, which means that firms should aim for a zero contribution to GHG emissions. UNEP developed a four-step framework for achieving carbon neutrality.⁷⁸ The first step is avoiding certain contributory activities, where avoidance does not result in a significant change in the quality of service or product delivered. For example: constructing buildings that can heat and cool themselves, instead of relying on heating and cooling systems that consume fossil based energy; the use of recyclable water bottles; and encouraging more walking safaris instead of game drives. The second step is to reduce the emission of GHGs by improving efficiency in terms of specific activities. For example, servicing motor vehicles frequently to ensure fuel efficiency and hence less GHG emissions. The third step is to substitute practices that produce GHGs with those with a lower carbon footprint. For example, encouraging walking safaris instead of game drives. The final step is to offset

the remaining emissions to achieve full carbon neutrality, for example, growing trees in communities near where tourism firms operate.

Carbon neutrality is among the most challenging CSFs for SSA destinations. First, building by-laws in some SSA countries (for example Zimbabwe, Botswana and Zambia) do not recognise some green building models. It is imperative that these destinations revise these by-laws to recognise new and innovative green building standards for tourist facilities, including restaurants, hotels and lodges. Another factor that makes achieving carbon neutrality difficult is that most SSA countries rely heavily on fossil fuels for the energy needed to transport tourists from their home countries to, from and within their tour destinations. Difficult as this objective could be to achieve, efforts by countries should be visible, for example, through the level of maintenance of vehicles (through routine servicing) to reduce pollution arising from inefficiencies due to a lack of regular vehicle servicing. This and other related checks could be made mandatory for all tourism business operators.

Another challenge associated with this climate mitigation measure is that achieving carbon neutrality requires the cooperation of the entire supply chain. In this regard, it is important for the tourism industry to reduce the spatial distribution of its supply chain as much as possible, by sourcing local goods and services. For example, the industry could support the development of its catering supply chain and source locally produced foods to reduce 'tourism food miles'.⁷⁹ Currently, most food consumed in tourism facilities in SSA is imported from as far as Europe and thus has a high food carbon footprint.

Whereas some SSA countries' governments have made strides in coming up with policies to aid the mitigation of climate change, uptake and participation by the tourism industry in implementing the policies has been slow. This may be a result of the limited level of involvement and consultation during the phase when the policies were being enacted. It is critical to involve all stakeholders, including local communities that benefit from or are impacted by tourism activities in making the rules about climate change mitigation.⁸⁰

Funding is a key critical success factor for climate mitigation in SSA. Climate change issues have been described as an 'unfunded mandate', especially by local governments whose budgets do not always reflect climate mitigation activities. Rogerson suggests that local governments are key players in implementing climate mitigation policies and need to be empowered with information and financial resources.⁸¹ To this end, it is critical that local governments are empowered with climate change information and resources in order for them to fulfil their mandates. Most of the nature based tourism in SSA countries takes place in remote municipalities, for example, Victoria Falls, Hwange, Chiredzi, Nyaminyami (Zimbabwe), Livingstone (Zambia), Thabo Mafutsanyana (Drakensberg, South Africa) and Limpopo (South Africa). The municipalities need adequate funding to carry out their climate change management work.

CHALLENGES AND CSFS RELATED TO THE ADAPTATION OF TOURISM TO CLIMATE CHANGE

The need for adaptation stems from the realisation that climate change has unavoidable impacts that need to be managed.⁸² Furthermore, there is growing awareness among travellers about environmental sustainability. It is therefore imperative to create a climate resilient tourism industry. SSA tourist destinations should position themselves appropriately by making relevant changes. Visible adaptation practices communicate the level of importance that climate change issues are accorded in a particular region. For example, as seasons change, the tourism industry may need to alter its activity calendar to reflect the anticipated shift in seasons. Some products also need to be altered completely. Cultural tourism may be promoted in place of wildlife based tourism (where these have been affected by climate change). These cultural tourism products may need to be created in order to retain the attractiveness of destinations to tourists despite climate change induced losses. Investment in smart energy technology for delivering some of the conditions needed for tourism activities may also need to be considered, for example, snowmaking technology to help extend the winter season could be considered, provided that the authenticity of the end product is not at stake.

Another factor that explains the need for adaptation is that climate change impacts are localised and the nature of the impact differs between tourist destinations.⁸³ For example, the shift in seasons and the temperature variability is not only localised to SSA, but is also seen in many other parts of the world, where one destination is experiencing an extended period of winter or summer. Therefore, it is critical that local industry players study the tourist source region climatic changes and make appropriate and viable adjustments to exploit the new opportunities and minimise the adverse impact. Adaptation policies, therefore, should suit local and regional realities, rather than be based on what other destinations are doing.⁸⁴ This further implies that adaptation strategies suggested at continental or regional level may not apply to all destinations on the continent. Once each country has come up with a policy, it should be cascaded to the various levels of the tourism industry in the country. This hierarchical characteristic will help with information gathering and monitoring pertinent issues related to climate adaptation at the different levels in each country.

Adaptation strategies have been largely camouflaged by climate mitigation strategies in SSA, resulting in tourism industry players lacking clear guidelines on what they should do in order to adapt to climate change within their own realities. Awareness could be raised through workshops or by using existing tourism industry structures in which tourism business players already participate. Adaptation awareness is also important for other residents of the destinations, apart from the players in the tourism sector. This is because there has been a tug-of-war situation in most SSA countries as locals compete with tourism players for resources.⁸⁵ For example, Manwa talks of the conflicting interests that exist in Zimbabwe regarding protected areas where locals engage in poaching game

and wood, which further strains the resources that attract tourists to the area.⁸⁶ There are similar cases in Zambia and South Africa. This conflict may be the result of a perception by local communities that they are deprived of resources for the sake of tourism. Locals may need to be educated that wildlife is not only preserved for tourism, but rather that the populations are threatened by climate change and that if these are not managed, some of them may become extinct, and hence the need for everyone in the region to contribute towards their preservation. Awareness also needs to be raised regarding new information about managing climate change, in view of the fact that climate change is a continuing phenomenon that continues to yield new and additional information relating to its management.

Formulating industry specific adaptation policies for the tourism sector is a plausible approach in SSA countries. The policy framework for tourism industry adaptation should be developed in consultation with all industry stakeholders to enhance buy-in. Generally, such a policy could serve as a reminder about climate change adaptation measures and also serve to enhance consistency and the development of tools for use in implementing the policy.

Funding for research in climate change adaptation is a critical factor in SSA. To avert the impact of funding deficits, SSA governments could, for example, research and document traditional knowledge regarding adaptation practices and harness these for the benefit of the tourism industry. Research helps policy makers and implementers gain an appreciation of the nature and extent of the impact of climate change on their tourism sector and thus informs the sector of possible future changes to which the industry will need to adapt.⁸⁷

When all is said and done, a key success factor for the tourism sector to successfully adapt to climate change is the need to adopt alternative tourism development models. Possible avenues in SSA include the incorporation of culture based and other possible tourism products that are not nature dependent and thus do not necessarily suffer from the adverse impact of climate change.

CONCLUSION

The importance of tourism to SSA countries cannot be disputed, and so are the challenges posed by climate change against the development of the sector. SSA is one of the most vulnerable regions in the world in the face of climate change, due to its reliance on tourism as a major sector for economic development, and the heavy reliance of the tourism sector on nature. As effects of climate change have been increasingly felt in the region, some SSA countries have developed climate mitigation strategies to reduce the further contribution of their countries to climate change. Tourism is one sector affected by these policies, because it is directly affected by climate change. However, the implementation of these policies rely on governments increasing the capacity of industry to implement

the policies, by empowering local governments, mainstreaming the policies, and committing to implementation by funding the policies. Furthermore, established climate change response strategies for some Sub-Saharan countries have not clearly outlined adaptation measures for the tourism industry. It is imperative that governments work together with the private sector and communities to identify alternative tourism products that rely less on nature, in order to enhance the viability of the tourism industry.

The following CSFs exist for climate change adaptation and mitigation:

- i. that mitigation strategies should be country specific and tailored to each country's environment and situation – within each country, each tourism destination needs its own climate change mitigation and adaptation strategy;
- ii. the planned climate change mitigation and adaptation strategy should contain key issues that should be closely and constantly monitored to feed important information into the national response strategy for mitigation and adaptation (hence the importance of research); and
- iii. adaptation should be a stand-alone strategic response area and not bunched with mitigation, as the tourism industry needs explicit adaptation strategies that are developed in consultation with industry experts, researchers and business practitioners in the area, and backed by relevant changes in important policies.

This would create an environment for easy adaptation to climate change.

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PART VI

Emerging Issues

Concluding Remarks

The Status Quo, Policy Lessons and the Way Forward

Vuyo Mjimba

INTRODUCTION

It can be argued that the quest for sustainability in its various forms and scope is gaining irreversible traction. The choice is no longer whether or not to remain outside the sustainability drive, but rather, how to practically engage with the discourse. This quest for sustainability is being pursued under different labels, among which are: sustainable development, green economy, green growth, biodiversity management, green industrialisation, and climate change management.

Engagement with the sustainability drive is evident in both the private and public spheres, but these differ in age, depth, breadth and scope. Although the engagement approaches differ, they are characterised by uncertainty regarding minimal gains from investment in the short, medium and long term. They also share in the paucity of instruments to measure return on investment aimed at advancing the sustainable development agenda. Despite the uncertainties, sustainability concerns are now firmly rooted in daily economic and social practices. This firm rooting derives from what the concept promises, i.e. a future in which economic, social and environmental development receive equal consideration in all deliberations that concern humanity and the planet earth.

Together, the 12 (largely empirical) preceding chapters demonstrate the complexity and diversity of policies and practices that contribute towards the goal of sustainability. The chapters invited (and partly addressed) the following questions: Why is sustainability critical and possible? What is the nature of and the determinants of engagement with sustainability concepts, particularly through the lenses of innovation, climate change and a green economy? How can sustainability be entrenched in all aspects of human practices, so as to lead to improved standards of living and away from poverty and unemployment?

REVISITING THE IMPORTANCE AND POSSIBILITY OF SUSTAINABILITY

Sustainability is a broad discipline that sheds light on how natural systems function in their diversity to produce everything needed for the ecology to remain in balance.^{1,2} It acknowledges that human civilisation requires resources to sustain the modern way of life. The preceding chapters explicitly and implicitly elucidated the importance and possibility of a sustainable world. The drivers of a sustainable world can be placed into three broad categories, namely:

- i. managing risks;
- ii. access to markets and integration into global value chains, and;
- iii. innovation.

Each of these categories will now be discussed briefly.

MANAGING RISKS

At the core of the sustainability discourse is managing risks in terms of the already experienced and projected damages to various ecosystems that result from unsustainable anthropogenic activities, which are mainly caused by production systems and structural defects in global and national governance. The associated risks threaten human economic and social well-being. Climate change and its associated risk is the biggest single threat to sustainability. This is due to the adverse impacts of climate change induced extreme weather events that threaten human existence by disrupting physical, social and natural infrastructure, as well as systems that are critical for human survival.³ In addition, sustainability also addresses issues of resource scarcity - the scarcity of natural capital in particular. Of great concern in natural capital is the depletion of fossil fuel reserves. Industrialisation of the developed nations was powered by access to and use of 'cheap' fossil fuel energy. However, this traditional energy source, presents two challenges: it is finite and it is a major contributor to greenhouse gas (GHG) emissions, which causes global warming, which, in turn, ratchets up climate change. A cause for concern is that the industrialisation of developing countries (which is currently led by the emerging economies of Brazil, China, India and South Africa) is increasing fossil fuel consumption and, with it, GHG emissions.

The world has not ignored these risks. Instead it has reacted by formulating and enforcing a number of increasingly stringent environmental and sustainability policies. These policies are largely anchored on international policy regimes which in turn are translated and permeated into public and private economic and social policies and practices at the national, provincial (state) and local levels.

ACCESS TO MARKETS AND INTEGRATION INTO GLOBAL VALUE CHAINS

The interconnectedness of production and consumers across the globe is forcing producers in one part of the world to react to concerns from buyers and consumers in another part of the world. The sustainable production of goods and services is increasingly becoming a determinant of integration into many global value chains. As part of efforts to create sustainable value chains, companies are paying greater attention to the operations and management practices of their suppliers, distributors and partners.⁴ This is meant to help in managing the reputational risks of being identified as a supplier of unsustainable goods and services. This is important, because the magnitude of a sustainability conscious consumer is increasing with improving standards of living. These conscious consumers are increasingly refraining from purchasing and consuming products and services that degrade the environment and thus threaten their standard of living. Firms and their suppliers are thus responding to this critical demand by innovating so as to supply sustainable goods and services.

INNOVATION

The depth and breadth of technology advances seen in the nineteenth and twentieth centuries have given the world a sometimes false, but useful bravado. This innovation driven bravado could be critical for the increased adoption of sustainable practices. Advances made in technologies such as solar, wind, geothermal, small hydropower and wave (ocean) energy have made the exploitation of these energy sources to power economic and social activities not only possible, but also relatively affordable compared to earlier efforts. Awareness of these technologies and the characteristic human confidence and bravado in the twenty-first century suggests that, in the future, innovations in sustainable technologies are likely to set the agenda for business and social activities globally.

NATURE AND DETERMINANTS OF SUSTAINABILITY ENGAGEMENT

Overall, all the chapters in this book have made an attempt to present sustainability as a multi-dimensional concept. The chapters and diction in this book vividly illustrate this assertion. The reality of economic and social conditions in many developing countries suggests a sustainability focus that, first and foremost, seeks to improve economic and social wellbeing, albeit without compromising good environmental stewardship. To this end, jobs and the means to directly and indirectly sustain these jobs feature prominently in the book. For instance, Gossow, Buys and Mearns (Chapter 2), and others in Part 3 of the book, emphasise the importance of creating decent jobs that address the psychological impact of unemployment and poverty. The authors argue a case for the inclusion of psychological analysis in the green economy transition space. This is important, because

economic considerations often tend to subordinate other concerns. The common practice is that where environmental and other concerns conflict with economic concerns, the later considerations prevail.⁵ The main driver of this outcome is not necessarily disdain for non-economic concerns, but rather the dire need to improve economic conditions to address deep-seated poverty often leads to the subordination of other considerations, especially the environment management consideration. As a compromise, and in an effort to ensure that social and environmental concerns are not neglected, countries are championing the sustainable development mantra as an inclusive means of all addressing societal concerns. For example, in South Africa, this transition is being promoted as a means to lift historically disadvantaged citizens out of persistent apartheid induced poverty. For these majority black citizens (and others), this articulation paints a picture of a life out of poverty that will be characterised by access to jobs, sustainable and clean living conditions and guaranteed human rights.⁶ More important is that employment has been found to be crucial in addressing psychosocial needs in societies where high employment level is the norm.⁷ Employment and related benefits of employment induced socio-economic status are important determinants of physical and mental health.⁸ For many developing countries, this is important in terms of addressing historically linked disadvantages of native populations. The envisaged green jobs and other economic activities that could improve human well-being exist in different sectors of the economy.

Chapters seven, eight, ten and thirteen highlight the importance of natural resources in the context of the sustainability discourse. Francis et al. (Chapter 7), in particular, discussed harvesting of timber and the benefits provided to local populations through employment and royalties collected from the exploitation of this resource. Sithole and Francis (Chapter 8) reinforced this point. Mutana (Chapter 13) tacitly referred to the benefits that accrue from tourism - nature-based tourism in particular and services provided by nature. Mutisi and Nhamo (Chapter 10) referred to nature services through the lens of wetlands pollution and the need to embark on conservation of these areas. Focusing on the wider ecosystem, Sango (Chapter 9) highlighted the same point through the case of the Addis Ababa, Ethiopia study. An important observation in these works is that moving towards a fully sustainable world dictates the need for a systemic paradigm shift. This means that all aspects of human activities have to change and reflect sustainability. Althernburg et al.,⁹ argue the case for a systemically competitive policy and legislative regime as an important component of a competitive developing and growing economy. The authors articulate the need to develop specific task/goal oriented (i.e. sustainable development) cultural values that are shared by a large portion of society. These values must be lodged in a basic consensus on the necessity of a particular task. More importantly, all stakeholders must be in a position to participate in the joint formulation of visions, strategies and policy implementation practices.¹⁰ This is important, and Evans and Musvipwa (Chapter 11) bring an important angle to this view by examining the importance of the media in this regard. The writers note the poor media coverage of climate change issues in Southern African media. This situation retards progress towards a fully

systemic sustainability transition, by limiting wider communication of the transition agenda, as posited by the systemic competitiveness argument advanced by Altermann et al.¹¹

CONCLUSIONS, LESSONS AND THE WAY FORWARD

Sustainability and its related terms carry different meanings and interpretations. This is expected for a concept that straddles economic, political, social, technological and environmental realms, among others. As a result, both research and practical work on the subject receive different types of focus and attention. This means that when (or if) the destination of being fully sustainable is reached, the end results - like the transition journeys - will not look the same. The differences will be dictated by the economic, environmental and social conditions of the process - at the beginning, during and at the end of the process - in the various economies. As a result, how the different countries make progress towards sustainability is not critical; what matters is that they make the desired progress. A statement by the late Sanjaya Lall summarises this position: 'There are not only "many roads to heaven", but also many heavens'.¹² This is an important lesson that is critical for policy formulation and implementation. The one-size-fits-all approach will not work.

Indications are that the policy and legislative changes in the cases presented in this book are yet to realise the coherence required for a systemic and competitive transition. For example, Sarakinsky (Chapter 2) articulated the challenges of intra- and intergovernmental and departmental challenges in the green economy transition space. Sithole and Francis (Chapter 8) noted the disparities between local leadership and national government institutions and structures in managing woodlands as natural resources that contribute to the sustainable development drive. The authors concluded that the two competing structures create space for the exploitation of natural resources for personal gain, instead of wider gains. Francis et al. (Chapter 7) confirm this by arguing that contestations in resource exploitation and power asymmetries result in unequal benefits. Their work shows that local communities and forests are the losers in the contest of timber exploitation in Lupane, Zimbabwe. In the same vein, Kupika and Nhamo (Chapter 12) noted the limited mainstreaming of climate change adaptation and mitigation consideration in the wildlife policies of countries in Southern Africa compared to those in the East African countries. They conclude that this is a limiting factor in terms of a fully sustainable wildlife policy regime in Sub-Saharan Africa (SSA). Addressing these and other concerns dictates the need to learn from other experiences.

An ideal response to this drive points towards the importance of a policy regime that is systemically competitive and coherent for the firm and full establishment of a sustainable world. Ideally, such a policy regime has to cascade from the international policy arena, permeate to the national policy regime and then further to lower government and

private sector realms. While the international arena is important, the issue of sovereignty - described as the legal capacity to take decisions free from external constraints - determines the ultimate efficacy of any international policy regime. Irrespective of the source (international, regional or national) or strength of a policy, attaining a systemically acceptable and implementable policy regime is difficult. This is because 'policy' (as a concept) embodies multiple dimensions and uncertainties regarding policy levers and policy impacts. In pluralist societies, different political interests and conflicts between parties and pressure groups make it difficult to achieve absolute policy coherence.¹³ Consequently, absolute policy coherence is not possible except under absolute dictatorship. Also, it is important to note that policy incoherence can either be intended or unintended. Intended policy incoherencies arise from attempts to pacify different actors with different legitimate and illegitimate policy expectations.¹⁴ Unintended incoherencies derive from limited knowledge pertaining to the wider effects of policy decisions. Since the sustainability outcomes cut across political borders, policy coherence considerations have to take cognisance of the international policy space. The challenge is securing an innovative, dynamic and coherent local, national and international policy regime that ensures systemic transformation towards sustainability. The question is: How can this be achieved?

Nilsson et al.¹⁵ describe policy coherence as 'an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas, [in order] to achieve the outcomes associated with jointly agreed policy objectives'. Since the concept calls for synergies between and within different policy areas, it is thus a call for a paradigm shift in the policy formulation, implementation, and monitoring and evaluation space. This is important, because the policy space has to be examined increasingly as both a process and outcomes space. This is a paradigm shift in the established policy analysis space. Accepting the need for a paradigm shift, Mjimba (Chapter 5) argues a case for the recalibration of fundamental economic principles in terms of the human needs and wants concepts. He asserts that global inequalities have led to the conflation of the distinction between 'real' human needs and wants to the detriment of the sustainability drive. He was in fact, advocating for a paradigm shift in terms of the perception of economic development (and growth) as a means of addressing human needs and wants. The challenge is whose paradigm must shift and how? The 'why shift?' question has been addressed by the absolute need and justification for a sustainable world. This answer and its justification also address the 'whose' paradigm must shift question. It is the entire economic and social paradigm that must shift to carefully consider the question of environmental development.

Höppener (Chapter 6) partly addresses how this paradigm can shift. Her argument points to the fact that the centre of this shift is an appropriate human capital base operating at all levels of economic activity globally. She presents and argues a case for ensuring that all professions play an appropriate role in the sustainable development arena. Through the lens of training engineers at the university level, Höppener posits that the

genesis of a systemically sustainable base of professionals is ensuring that each profession is clear about its role in the sustainability arena. This has to be achieved at both the personal and organisational levels. Contributing to the development of ideal human capital, Pophiwa and Ntombela (Chapter 3) note that such human capital is not abundant, particularly in developing economies. To this end, the scholars presents an argument for importing the appropriate human capacity and capability. This argument is presented with full cognisance taking of the challenge of hostility to imported skills that may manifest in various xenophobic practices. Despite this, they further argue that importing such labour will grow the green economy and create jobs for locals in South Africa. They conclude by highlighting the need for a dynamic immigration policy that attracts skills that the country needs. A critical issue in this space is dispelling the common view that immigrants take jobs from the natives and drive wages down. There is empirical evidence to the contrary. This evidence suggests that an economy responds to immigration by increasing the demand for labour.¹⁶ Thus, in the long run, the impact of immigration on jobs for the natives and wages is small.^{17,18} This implies a need for a paradigm shift of views on immigrants, particularly those who are appropriately skilled.

Summing up, the reasons for the need to be sustainable are now beyond dispute, so the sustainable development drive is a must and not an option. The determinants, linkages and outcomes of and between transitioning towards sustainability and remaining untransformed, continue to be better understood. An important way forward in this regard is progress towards some form of common understanding and perhaps even (limited) agreements in the descriptions and definitions of key terms, objectives, incentives and sanctions in the sustainable development discourse. With this arsenal, perhaps the journey towards the many heavens of sustainability can be hastened.

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Sustainability, Climate Change and the Green Economy

This book is a compilation of blind peer reviewed chapters from an inaugural International Conference on Innovation for Sustainability under Climate Change and Green Growth/Economy. The conference took place at the Birchwood Hotel in Boksburg in South Africa from 26 to 28 May 2015. More than 400 participants from across the world attended this three-day event hosted in the Ekurhuleni Metropolitan Municipality. The book is a direct product of the Exxaro Chair in Business and Climate Change hosted by the Institute for Corporate Citizenship (ICC) at Unisa. The ICC falls within the College of Economic and Management Sciences (CEMS). Among the main programmes and initiatives addressing sustainable development, green economy and climate change at Unisa are: the Green Economy and Sustainability Engagement Model, the Bioderived Fuels and Solar Technology Transition under Climate Change and Green Economy and Growth, Vice Chancellor's Sustainability Mainstreaming Programme, the College of Economic and Management Sciences (CEMS) Going Green Initiative and CEMS Research Flagships, among them the Climate Change and Green Economy Flagship coordinated from the Exxaro Chair.

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